

THE AIR MENACE
AND
THE ANSWER
O
ELVIRA K. FRADKIN

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THE AIR MENACE AND THE ANSWER



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THE AIR MENACE AND THE ANSWER

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INTRODUCTION BY

James T. Shotwell

*Chairman of the American National Committee on International
Intellectual Coöperation of the League of Nations*

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*This book is dedicated
with infinite love and humility*

TO

MY ONLY SON, NOEL
who died that other children might live in all lands

AND

TO ALL CHILDREN IN ALL LANDS
into whose pure hearts no more hatred or distrust should be poured



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INTRODUCTION

IF there is to be another war, we know only one thing about it—that is, how it will be begun. No one can tell what will happen after it gets started, nor how much of civilization will be left at the close, but the one sure fact is that it will begin in the air. For the air forces are the storm troops of the armies of today and tomorrow; their scout planes ride the only fields that are left unfortified, their bombers are the only artillery with a trajectory of a thousand miles. It is the engineer and the chemist who henceforth will lead the van of destruction.

This fact is a commonplace among technicians, but the full extent of the menace which lies in it becomes evident when one studies not only the extent of existing chemical armaments, the capacity of industry and applied science for making them, but also the extreme difficulty of finding any basis of agreement for their limitation or reduction through international agreement. Both airplanes and chemicals are of use in the ordinary activities of peace. There is little hope of controlling naval and military airplanes unless civilian airplanes are also rationed among the nations or are subjected to international direction. The process for the production of nitrate from the air, for example, for the purposes of increasing the food supply differs only slightly from that used in the production of nitrate for high explosive. How can the one be kept and the other prohibited? This is a problem infinitely more complex than that of adjusting between nations the ratios of arms or of ships. There

is no arithmetical ratio in chemistry; the answer must be found some other way.

The pages which follow furnish a realistic guide to what has been done—and what still remains to be done—in solving this most baffling but most real of problems. While the author is not a technician in either chemistry, or aëronautics, she has brought together the conclusions of competent authorities and set them forth in the terms in which they must be considered if the civilized world is ever to be freed from the menace of armaments. For, as this book points out, it is impossible to deal effectively with chemical warfare except as a part of the general movement for the elimination of war itself. In so far as nations continue to resort to war or the threat of war, they and their neighbors will continue—and indeed must continue—to prepare against the dangers which it opens up before them. And as the best preparation is that which keeps ahead of others, the more industrialized a nation is the more it will turn to science and invention to increase its control over nature, to win speed that it may outdistance its opponents, and to make more deadly its instruments of destruction. Therefore, while warfare in the air has by no means displaced that upon land or sea and the progress in engineering in these other fields has kept pace with it, nevertheless it furnishes a test for intelligence which marks it off from the rest because of the fact mentioned above, that the elements which enter into it are those necessary for the progress of peace-time industry. Tanks and guns have no other purpose than destruction. On the other hand, the chemistry and the engineering that lie behind aërial warfare must be developed and encouraged, and therefore the only solution lies in ridding the world of the need for turning these gifts of science to the service of war.

The conclusion, as Mrs. Fradkin shows, is one which soldiers, rather than leaders of the peace movement, have been

the first to point out. It is that disarmament depends upon getting rid of the need for arms. While the reduction of armaments may play its part in lessening the apprehension of danger, disarmament in the fuller sense of the word will depend upon securing substitutes for war itself, learning to apply them when the issues are not grave so that in times of crises nations can turn to them with confidence and a full appreciation of what "pacific settlement" implies. More definitely, this means acceptance of arbitration and the World Court for matters that can be placed before tribunals, and conciliation and conference, through an organ like that which the League of Nations supplies, for those political disputes which most often in the past have resulted in war. Unless this machinery for the pacific settlement of international disputes is already at hand, recourse cannot be had to it, because it is well-nigh impossible to improvise it when it is most needed.

But the maintenance of peace depends, in the last analysis, on something more than machinery. It rests upon the confidence of nations that the machinery will work in the interests of justice, and this, in turn, depends upon the development of the sense of justice within the nations themselves. The growth of the social conscience is the measure of a nation's intelligence, and in proportion as it is developed and applied, the menace of war by chemistry and engineering will be overcome. The alternative is fully set forth in the pages which follow.

JAMES T. SHOTWELL



PREFACE

How much more pleasant it is to agree on a definite subject than to disagree! In that way progress is made.

Therefore, in choosing to continue my research into modern methods of warfare, I have found myself, to my great astonishment and delight, agreeing more heartily each year with my military friends (for different reasons) on the subject of the necessity of abolishing aërial and chemical warfare. Our militarist friends detest chemical warfare because it is so nebulous and because it actually spoils the established rules and regulations of warfare in which they are so well grounded. These are causes enough for their opposition. How often they have pleaded, within their national councils and at international councils on disarmament for the abolition of chemical warfare. In the best of faith, with the sincerest of emotions, they have voiced, in many lands and in many tongues, this distaste. For chemical warfare does away very definitely with the old type of warfare.

After many years of study of this subject, I find myself in complete agreement with this stand, as far as it goes; but I go farther. In my intense dislike of chemical warfare from the point of view of a non-combatant, I see clearly that chemical warfare must do away with all warfare, if this civilization which non-combatants have built so laboriously throughout the centuries is to survive.

This unanimity between the military and myself is delightful as far as it goes. However, it does not go the whole way. The reader who pursues the theme of this book to the

end will be rewarded with a new insight into the problem of modern wars, modern disarmament, and modern security from the point of view of one who has no other interest to serve but the truth.

Since there are some technical parts in this book, a question that naturally arises in the mind of the reader is, "How can anyone write on the subject of chemical warfare and aviation and disarmament unless he or she is an expert in each field?"

A thorough college and university preparation, a close study for years of these aspects of disarmament, and tireless work, have given me the background. With all too few exceptions, the professional chemist has shown that he has not the time, inclination, or international attitudes for this type of study. Likewise, too few aviation experts have brought their minds to the problem of disarmament from the angle of expanding aviation. Years of unceasing post-war study, travel, and impartial investigation have added their share of balance to the emotional reaction due to the World War.

This book would never have been completed without the continuing faith of my friend, Mr. Edward P. Warner, Editor of *Aviation*, the steadying hopes of my many peace-loving friends, and the charity and deep understanding of my husband and father. To them and especially to Dr. James T. Shotwell, Mr. Malcolm Davis of Geneva, Miss Alice Bartlett, Librarian of the League of Nations, Dr. Brezsche-Vauthier, also of the League Library, Mr. William T. Stone, of the Foreign Policy Association, Mrs. Frank Day Tuttle, M. Henri Bouché of Paris, editor of *L'Aéronautique*, and to Mr. Lawrence Toombs, of the League of Nations Committee on Communications and Transit—to all these I give my thanks. None of these friends is responsible for any opinion expressed.

Repetitions in statements are for reinforcement of opinion. There is no apology necessary for that or for including in this book many affiliated aspects of armaments and disarmament. Disarmament, to be understood clearly, involves the consideration of many closely related subjects.

THIS BOOK IS NOT A TIRADE AGAINST THE CHEMICAL INDUSTRY OR AVIATION AS BEING ESPECIALLY GUILTY, NOR DOES THIS BOOK AIM TO HUMANIZE WAR. IT DOES AIM TO PROVE TO THE NON-COMBATANT HIS OR HER IMMEDIATE INTEREST IN DISARMAMENT THROUGH WORLD ORGANIZATION.

Finally, M. Briand has given me courage in the following:

"If the idea of peace is to reign supreme among the nations, we must not shut our eyes to the fact that there are certain poisonous influences persistently at work. Nor all men are enamoured of peace. There are in every country those who are secretly and disloyally working against peace. These movements must be watched. You who are interested in social work and are tracking down the traffic in opium and morphia must turn your attention, too, towards certain machinations aiming at nothing less than the poisoning of the minds of children, by sowing in them systematically the seeds of war, by instigating them to every kind of secret revenge, as though to make the future generations, generations of hatred and blood. Those who, by their writings and their teaching, are so moulding these generations, are nothing less than odious criminals.

"It is to the women particularly that I appeal. It is for them, then, to prevent this poison from penetrating our country. On that, peace depends. The day children are taught to respect sister peoples, to look for what men have in common rather than for their points of difference, we shall no longer need to measure out security and set the provisions of the Covenant in motion, for peace will already be enthroned among the nations."

From an address at the
Tenth Assembly of the League

ELVIRA K. FRADKIN.
Montclair, N. J.



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PART I
CHEMICAL WARFARE



CHAPTER I

WHAT IS THIS POISON GAS SCARE?

SINCE the World War, there has been an increasing number of articles and books on the subject of the "next war." Prominent men have given free rein to their imaginations and horrors have been conjured up to make the skin creep. But horrors have never stopped a war in the past. To conjure up horrors, no matter how probable, will not stop men from going to war in the future. Patriotism, deeply stirred, laughs at horrors.

Why, then, this talk about poison gas?

This form of warfare, first used on an extensive scale during the war, is threatening not in itself but in combination with the airplane. The steady development in research in poison gases and the constant development of the airplane performance are in war time a menace to every living thing within the war area. What with high explosive bombs, poison gas and the bombing, pursuit and combat planes, the existence of civilization is at stake.

Therefore the interest in the development of poison gas and the exploits of the airplane are becoming daily more of public concern. Some very clear thinking is necessary on this subject. That is why this book treats the subject objectively and factually. Conclusions are drawn on the basis of fact. The time for sensational, highly colored writing is past. The facts are needed as never before. The facts in connection with poison gas are placed before you.

Poison gas has come to stay. Regardless of international commitments, regardless of the desires of individuals, poison gas as such has come to stay. As long as there is a dye factory anywhere in the world, as long as there is a chlorine factory anywhere in the world, as long as there is a nitrate fixation plant—there will be poison gas. This statement stands unchallenged in view of the fact that one of the major elements in the industrialization program is the chemical industry. The increasing importance of the chemical industry to war-makers leads us to scrutinize carefully in this book the connection between it and war, and what we can do about it.

To clarify our thinking on the subject of poison gas, we must analyze the phrase into its component parts. The term "poison gas" is defined as follows in international treaties: "asphyxiating, poisonous, or other gases and all analogous liquids, materials or devices." Actually this is no definition. Poison gas as a weapon of modern warfare is very elusive, and its definition is equally elusive. Poison is defined as "any substance which, when taken into the system, acts in a noxious manner by means not mechanical, tending to cause death or serious detriment to health." Gas, as such, is defined as "matter in the æriform state; that fluid form of matter which is elastic and tends to expand indefinitely." From these two definitions we gain a clearer conception of the action of poison gas and even of its nature.

Chemical experts and political experts vary the definitions of poison gas according to their desires, allowing such a latitude of action that the manufacture of poison gas is not controlled by the definition nor its use prohibited. This is important in view of the fact that representatives assembled at disarmament conferences have for years been vainly trying to solidify the definition of poison gas in the effort to control the actions of governments and the reaction of public opinion. Some gases (chlorine, for instance) are in liquid

form in the container, and thus may be shipped from one country to another and within the manufacturing country for bleaching or the purifying of water. Thus it is constantly manufactured and shipped from producing to non-producing countries. It can be used instantaneously for a poison gas, depending on the method of dispersal. Some chemicals ready for poison gas use are in solid form, some of them are mixed in the smokes in the particulate state, and hence are not technically gases. Lachrymatory, or tear gases, have not been included in the general term "poison gas" because they are being used in peace time against mobs. But here the difference in definition is difficult, for chloropicrin in mild concentrations is effective as tear gas, but just increase the concentration and you have a lung irritant, sufficiently strong to produce serious casualties. It is entirely a matter of precise definition and precise concentration, both of which seem impossible of achievement.

Poison gas is directly related, in the minds of the majority of people, to chemical warfare. Its employment for war use enables us to define chemical warfare as the projection in war "by any means available in either solid, particulate, liquid, or gaseous state of deleterious, asphyxiating, or lethal gases and smokes." However, the loopholes in such a definition are obvious. Is a war not a war because it is officially undeclared? Can poison gas therefore be used in an undeclared war? Furthermore, when is a nation or the police force of a nation permitted to use tear gas against threatening mobs? The doubt in the first and second questions permits Japan to drench Shanghai with smoke and poison gas in her undeclared war on China. The third suggests the consistent use of tear gas by the United States with the coöperation of state and local authorities on strikers, on rioters, and on jail breakers. This practice of supplying our police with tear gas bombs was one of the major factors which prevented the

ratification by the American Senate of a protocol prohibiting the use of poison gas, in the Geneva Convention of 1925, and hinders adequate differentiation of its use as well as nullifying the definition.

The difficulty in attempting to define chemical warfare in technical terms can be seen from the deliberations of the Special Committee on Chemical and Bacteriological Weapons in their report of May 31, 1932, to the General Commission of the Conference for the Reduction and Limitation of Armaments, which is to be found in Appendix I at the end of the book. No definition has ever been elastic enough to permit peace-time chemical expansion and at the same time achieve complete abolition of conversion to war-time uses. Poison gas has come to stay.

How has it been used in past wars? That will give us an insight into its use in modern wars.

Its Use in War

In a recent issue of an English magazine the similarity of certain human traits to those of the lower animals was noted. The writer told of the different methods of defense of the tree termite from that of his cousin on the ground. The defenders of the tree-dwelling species have heads swollen and drawn out into phial-like necks. "In fact," we are told, "their heads are phials. They are filled with glands which secrete a horribly adhesive material, and their method of fighting is to squeeze some of this out at the hole at the tip of the phial-spout, thoroughly gumming up their enemies. They thus share with a few other insects, modern men, and skunks, the distinction of having invented chemical warfare." Human termites, on the ground, however, have had to acquire their skill in chemical warfare artificially.

Although the term "poison gas" is new, the use of such methods in warfare can be traced back many hundreds of

years. Twenty-three hundred years ago when the city of Plataea was besieged by Spartans in 429 B.C., the attacking troops placed enormous pots of pitch, sulphur, and burning charcoal against the walls so that the irritating gases from the mixture would reach the beleaguered fighters and annoy them. A century later, Ænæs Tacticus spoke of using pitch and sulphur in the Peloponnesian war. He also noted that an inextinguishable fire may be created by the combination of pitch, sulphur, tow, granulated frankincense, and pine sawdust in sacks.

Emperor Leo VI spoke of the value of this fire and also advised throwing jars of quicklime on the enemy's ships to suffocate him, a form of naval gas warfare. In the historical annals of Genoa, describing a war fought between that city and Pisa in 1284, we read that "a bitter and hard fight began from both sides. In it so many missiles containing lime and other alkalies were used that it seemed as though none were present,"—meaning that their eyes were so irritated that they could not see. It is interesting to quote a description of a battle fought in 1456 between the Turks and the inhabitants of the beleaguered city of Belgrade, led by Hunyadi and St. John Capristan:

"Late in the afternoon, July 21, 1456, the Turks hurled themselves against their prey. They filled the moat with straw, rubbish, and brushwood, gained a passage and stormed the broken walls. The Moslems set up an attack so terrific that they broke their way into the city as far as the second wall and moat. There the Christians held them fast. The Turks brought up more rubbish and brushwood and filled the second moat. Then they sought to scale the walls. Although the Christians' defense was vigorous, the odds in men and position were all in favor of the enemy. But suddenly, at a pre-arranged signal, the Christians began hurling down upon the massed forces of the enemy bundles of burning sulphur-steeped brushwood. The effect was swift and decisive. The rubbish-filled moat became a pool of raging fire. Caught between the wall and the moat, the Turks perished by thousands in the flames and the fumes. The survivors became panic-stricken and fled."

In the Middle Ages, gas stink bombs were known and used. Even the Chinese and Malay pirates had a form of chemical warfare in their stinkpots. An old Austrian chemist, Vlit Wulff von Senfftenberg, in 1573, said of these bombs,

"It is a terrible thing. Christians should not use it against Christians, but it may be used against the Turks and other unbelievers to harm them."

A little later the value in warfare of smokes which screen the movements of troops was recognized. Gustavus Adolphus of Sweden, in 1631, learned from his adversary, Tilly, the value of great quantities of smoke in hiding the location of troops. He used this knowledge in the following spring when, by judicious placing of burning straw, the resulting smoke hid the building of a bridge over the Lech River, near Augsburg, and thus enabled him and his soldiers to cross unseen by the enemy and overwhelm him. In 1699, his successor, Charles III, used the same strategy against the invading troops and successfully crossed the Dvina River.

Indeed, the tendency to use in warfare such rudimentary chemical knowledge as the age could supply has been, with one exception, the irresistible tendency of military leaders throughout the ages. This fact is all-important in view of the present and future development of chemistry. This one exception is of such immediate interest that it will be reviewed. The first definite suggestion in modern warfare for the use of sulphur fumes to subdue a stronghold was made by the British officer, Lord Dundonald, in 1885. During the Crimean War he suggested that, with favorable wind conditions, the fumes from burning sulphur be wafted toward the beleaguered city of Sebastopol. Its effect, he prophesied to the conference of interested military leaders, would be instantaneous and highly deleterious to the Russians. Due consideration was given to the idea by the gen-

erals on the field and the War Ministry at home. However, the suggestion was finally rejected on the score of its inhumanity, "for it was felt that an operation of this nature would contravene the laws of civilized warfare." The investigating committees which had examined these proposals of Lord Dundonald's and pronounced that "the effects were so horrible that no honorable combatant could use the means required to produce them," also ordered the memoranda destroyed. However, in the lengthy memoirs of Lord Panmure, who was consulted by the British Government on this intended use of sulphur fumes, there was found, upon publication in 1908, the whole scheme as outlined by Lord Dundonald. This was read, supposedly, also by German chemists and improved upon during the World War by both sides, Allies and Central Powers.

It is an historical fact that the first clouds of poison gas (chlorine) were sent across to the enemy's lines by the Germans, during the World War, on the afternoon of April 22, 1915, and carried by a favorable wind toward the Allied lines, at a point in the Ypres salient where the French regiment of Turcos and the British regiment of Canadians met. Auld describes the attack as follows:

"Try to imagine the feelings and the condition of the colored troops as they saw the vast cloud of greenish-yellow gas spring out of the ground and slowly move down wind towards them, the vapor clinging to the earth, seeking out every hole and hollow and filling the trenches and shell holes as it came. First wonder, then fear; then as the first fringes of the cloud enveloped them and left them choking and agonized in the fight for breath—panic. Those who could move broke and ran, trying, generally in vain, to outstrip the cloud which followed inexorably after them."

Five thousand casualties was the conservative estimate as a result of this first attack.

This gas release was not actually the first attack which the Germans had attempted. It is recorded by one of their

leading chemists, and an army officer, that a previous attempt at gas warfare had been made on the Eastern front, but, because they did not know how to use weather conditions to the advantage of the attack, the result was that the gas returned to the senders, and death visited the soldiers themselves who were experimenting with the new device.

So new and terrifying was the first attack of gas warfare on the Western front that the Germans themselves had no inkling of its devastating success. Death, terror, and disorganization among the attacked troops cleared the path to that much-desired goal, the channel ports. The General-in-Chief of the American Chemical Warfare Section, General Amos A. Fries, has said, "Had the German High Command known the real situation at the close of the first gas attack, or had that attack been more severe, the outcome of the war of 1914 would have been very different, and the end very much earlier."

This, as it proved, was mere child's play to the gas warfare which was still to come. From the day of that first gas attack on April 22, 1915, to the present moment, and, in the future, as long as there is a possibility of war and as long as there is well-developed chemical and industrial preparedness, the research in and application of poison gases for war use will continue. The race is on.

During the World War this situation was sensed by the military authorities and a definite staff of chemists and other men who had had experience with gas poisoning in coal and copper mines were assigned to the task of meeting a menacing situation. This newborn Chemical Warfare Service had to start from the ground up. The Allies had been taken by surprise by that first German gas attack, even though it has been shown that the use of poison gas in warfare had been considered by them, and some simple preparations had been made, especially by the French. It

must be recalled that the Hague Conventions of 1899 and 1907 both forbade the use in warfare of "asphyxiating or deleterious gases" to the signatories after ratification, but here again the foibles of international agreements on prohibition of gas warfare became apparent. Since neither the United States nor Great Britain had ratified this agreement, the Germans claimed that it was not legally binding on them, even though they had signed and ratified this particular agreement. Here is that loophole, constantly threatening the efforts and jeopardizing the success of the final abolition of chemical warfare. International agreements to prohibit the use of poison gas in warfare have always been disregarded when war was called. (See Appendix II for the international agreements and their history.)

What is the value to the military of this deadly form of warfare? What types of poison gas are there that have proved to be of such value that never again will they be discarded if war is resorted to?

Types of Poison Gas

Chlorine—It is interesting to note that, in the first attack, chlorine gas was used because it represents the easily obtainable product of the great chemical industries of Germany. Chlorine is a by-product of the dye and bleaching factories, which were well developed in Germany, and furnishes the basis for many of the newer gases and mixtures of poisonous gases today. In strong concentrations it acts as a lethal gas, in weaker concentrations it is a sensory irritant. The first attack, under weather conditions perfectly adapted to the purpose, and in a strong concentration, had a strong lethal effect on the completely unprotected troops. It is estimated that five thousand men at least were gas casualties in this first single attack.

Chlorine is one of the ideal poison gases because it is

highly toxic; it is readily manufactured in large quantities; it is easily compressed into liquid form and then as easily volatilized when exploding from shells, bombs, or, as in the case of the first attack, from cylinders; its density is greater than that of air, hence it settles in valleys and depressions (cellars, dug-outs, etc.); it is stable against moisture; it is two and one-half times as heavy as air, and therefore the gas is capable of traveling over a considerable distance before it dissipates into the atmosphere. These qualities recommend its use as a basic toxic gas. The chemical industry can and will furnish great quantities of chlorine gas in future conflicts. It is so organized and planned. Such raw materials, necessary in the manufacture of other poison gases, as salt, bleach, picric acid, alcohol, sulphur, sulphur-chloride, bromine, etc., have been and can be obtained from national commercial firms. Their importation and storage is a major factor in chemical preparedness. The convertibility of such peace-time chemical factories into war-time poison gas producing units is planned in every chemical-producing nation.

Besides chlorine, what other gases are there?

Other Gases Developed during the World War—The Allies decided in May, 1915, that retaliation in kind was inevitable, and on September 25, 1915, after five months of hectic preparation following the first encounter, the first English gas attack was launched. However, it was the Germans who, because of advanced chemical and industrial development at home, could take the initiative in gas warfare in the field. This lesson was so thoroughly learned by the Allies that today development of the chemical industry is a part of the national defense scheme.

As protection through rudimentary forms of gas masks and gas-protected dug-outs was developed by the Allies against existing gases, they, the Germans, took the lead in introducing new gases. Thus, after chlorine had been suc-

cessfully tried, lachrymators, or tear gases, were employed to harass the enemy, such as xytyl, bromide, the French mixture called martonite (80% bromoacetone and 20% chlorobenzene), or, too, bromoethylketone. These lachrymators were dispersed by hand grenades, artillery shell, trench mortar bombs, Stokes mortars, light minenwerfer, projectors, and, sometimes, cylinders. Today they are dispersed by artillery shell, bombs, and even bullets. Gas pistols, even fountain pens holding lachrymatory gases, are manufactured for private use in peace time. In the World War, the Allies soon entered the chemical race and developed their ingenuity to meet the gas menace.

It was soon realized that lethal or lung irritant gases may also have a lachrymatory action. It all depends upon the concentration of the gas. For instance, chloropicrin is both lethal in strong concentration and lachrymatory in mild concentrations. Mixtures of gases may accomplish both results at the same time: for instance, chlorine (70%) and chloropicrin (30%), fired together, have a lachrymatory and lethal action. The advantage in these mixtures lies in the fact that a sensory irritant gas will so disturb the enemy that, upon permeating the gas mask, or upon the latter's removal, the lethal gas will take effect. These mixtures are a long study in themselves. Their worth was recognized in 1916 and from then on constantly developed. Still, only a beginning was made in their possibilities. Such combinations as hydrocyanic acid (55%), chloroform (25%), and arsenious chloride (20%) are specially effective lethal agents which, dispersed from artillery shells, can achieve strong concentrations in right weather conditions.

These mixtures accomplish another much-to-be-desired aim. An unusual or unknown mixture of poison gases can penetrate any gas mask not designed to meet this particular onslaught, and so render protection by that means impos-

sible. However, this phase will be discussed later when the general subject of protection is discussed. The art of mixing irritant and lethal gases is very important and very exciting. Wind, weather, temperature, moisture, all are contributing factors. Then, too, the objective to be attained must be considered and the most effective mixture for that purpose decided upon at short notice.

Here the work of the well-trained chemical warfare expert comes in, in close contact with the military expert. Each country is training its own experts for military and chemical tactics, the course is required in all military and naval academies, and added recruits are quickly obtained, when the real emergency arises, not only from industrial chemical laboratories, but also from the university laboratories. Professors of chemistry having well-established chemistry departments are in close touch with government plans and government-inspired research in all countries. This entente cordiale, started during the war, has been continued and developed. Exchange of literature on all sides, interchange of visits on all sides, and a carefully appointed national advisory committee of outstanding civilian chemists to consult with the chemical warfare departments, cement the needed alliance. In some countries, chemical research in government-endowed universities is directed and controlled by the government chemical service itself. This preparation is for the use in war of surprise tactics in gas—anything to break the will of the enemy.

The Classification of Poison Gas

It has therefore been agreed by the experts that all poison gases are graded into two classes: (1) the non-persistent gases, —that is, gases which, upon dispersal, quickly mingle with the air and lose their effectiveness; (2) persistent gases, that is, gases which, upon dispersal, linger for hours or even days,

with slowly diminishing strength and effectiveness. In the first class, first employed during the World War, may be found the sensory irritant gases, such as lachrymators, sternutators, vomiting gases, and lung irritant gases, represented by chlorine, chloropicrin, phosgene, etc. In the second class, developed as gas warfare became intensified, the outstanding success was and is mustard gas (dichloethylsulfide), the king of poison gases.

There is another classification of poison gases, dependent upon their principal action on the body, as follows:

<i>Action</i> ¹	<i>Gas</i>
1. Lung irritants (suffocants)	{ Phosgene Chlorine Chloropicrin
2. Sternutators (sneezers)	{ Diphenylaminechlorarsine Diphenylchlorarsine
3. Lachrymators (tear producers)	{ Brombenzylcyanide Chloracetophenone
4. Vesicants (blisterers)	{ Mustard gas Lewisite
5. Direct poisons of the nervous system	Hydrocyanic acid gas
6. Gases interfering with the respiratory properties of the blood	{ Arseniureted hydrogen Carbon monoxide
7. Incendiaries (burn producers)	{ White phosphorus Thermite Spontaneously inflammable liquids Solid oils

Thus gas warfare has become a science of the projection of irritant and lethal gases. This science has as its intensified aspect the development and use of the most efficient toxic

¹From Army Extension Courses, Special Text No. 57, *Medical Aspects of Chemical Warfare*, 1931, Section I, p. 2, par. 2.

gases. Hence the interest in mustard gas. Mustard gas (ClCH_2CH_2)₂ in the pure state is a colorless liquid with a boiling point of 220°C., and a freezing point of 11°C., which help immensely in its manufacture and shipment.

Mustard gas is called the "king of poison gases" because (1) in strong concentrations it is highly lethal (death may occur even up to the fourteenth day after exposure); (2) in liquid form as well as in the vapor, which the exploded shells and bombs scatter in all directions, mustard gas inflicts body burns, seeking out the moist parts first; (3) it penetrates all non-chemicalized clothing; (4) food or water, exposed even slightly to the vapor or liquid, is contaminated and, if consumed, causes severe gastric and intestinal symptoms and burns; (5) an area shelled or bombed with mustard gas is contaminated for days, and in warm, dry weather its potency is felt for weeks; (6) except for a light mustard or garlic odor, impossible to distinguish above usual city odors, there is no immediate realization of the presence of mustard gas, for the delay in reaction on the exposed person may last from two to six hours. (Hence greater doses of mustard than of other gases can be administered, with more serious effect, and those about to become victims are unaware of the exposure. This characteristic of mustard gas—delayed action—is very advantageous to the attacker. It is effective for, given an aerial bombing, one only knows hours later, by the appearance of a rash, red and ugly, quickly breaking out into pus burns, that mustard gas has been used.)

Furthermore, (7) in concentrations as slight as one part in 4,000,000, conjunctivitis of the eye results, while one part in 3,000,000 will cause skin burns (these take from three weeks to three months to heal); (8) as the specific gravity of mustard gas is much greater than that of air, it sinks into all depressions—cellars, dug-outs, subways, and

houses—and permeates all objects with which it comes in contact and, in warm, dry weather, remains there for weeks, making these subterranean shelters death traps, too. (9) Its vapor can be transferred from one contaminated person to another. (Doctors and nurses during the war were infected, as they cared for the gassed soldiers, by the vapor of mustard gas arising from the clothing of their patients, suffering severe external burns and, in some cases where the gas was deeply inhaled, severe burns in their respiratory tracts.) (10) This gas has a similar effect on all animals, as well as on all vegetation. Animals rarely blister, though the horse seems to be the most sensitive to mustard gas. Vegetation which has been destroyed by gas bombardments comes up afresh the following year.

Projected and Actual Uses of Poison Gas Today

Indeed, the list of military virtues of mustard gas (called by the French Yperite, because first liberated at Ypres, and by the Germans, yellow cross, from the shell marking bearing that inscription) is not yet exhausted. Sufficient qualities have been enumerated to enable one to appreciate those unnamed. Its tactical uses, based on its vesicant or burning action, as well as its action as a powerful pulmonary irritant, are: to neutralize effectively intervening territory, to produce enemy casualties, to destroy non-combatant morale, to besiege the enemy before an infantry attack, to drench rear communications and thus break continuity; to annihilate rest areas in the rear as well as concentration camps; to plant drums of mustard gas in the territory which the enemy must traverse as retreat starts, whose explosion as they pass would result in great numbers of casualties, etc. Simply sprinkling it on a city in liquid form from a speedy, low-flying airplane will have an effect on all beneath, dependent on the concentration achieved. Dumping liquid mustard gas into reser-

voirs has possibilities too terrible to portray, and yet it is probable.

Major-General Gilchrist, Chief of the Chemical Warfare Service of the American Army, said in a paper written in November, 1932, "The essential fact remains that gas can be controlled as easily as rifles, machine guns and artillery. The rule of control is very simple and it can be applied to gas as well as to other weapons: Do not liberate bombs, whether gas or explosive, where the liberation would endanger non-combatants. If this rule is followed, civil communities need have no fear." How heartily we agree with him, IF only the military would keep their gas warfare to themselves as they used to keep their battles to themselves. BUT—need I remind the General that bombing planes, even granted a zeal to keep within the prescribed zones (and these zones are not well established), not only drop their deadly gas bombs wide of the mark, unfortunately thus severely affecting civilians who live below, but also within the zoned districts of every large city,—such as railroad stations and industrial plants and centers providing war materials (and that phrase includes nowadays all industrial centers), civilians are living and working who will be involved in the casualties.

This form of argument—assuming that the civilian always can and will get out from under the feet of military encounters and away from air battles wherever they may be fought—is fallacious and unreal. Control of the area in which gas will be used, and hence limitation of its effect to enlisted men, is out of the question, because airplane bombing cannot be controlled or restricted. The same sort of fallacy is involved in the following statement from the General, which contains absolute truth inapplicable today:

"The fact remains, from experience gained in the World War, two things stand out most prominently: First, neither treaties nor

humanitarian motives have much weight in war"; [how very true!] "and, second, while thousands of tons of gas were used, yet there is not an authentic instance in which the inhabitants of cities or towns suffered to any extent from drifting gas; and, lastly, there is not a case on record in which war gas was used deliberately against non-combatants."

Of course not! That World War was mere child's play compared with today's possibilities in air strategy and gas technique. The 30,000 Chinese non-combatants who suffered casualties in Shanghai can tell you how efficacious is today's gas and explosive bombing from the air. Since the World War, methods of warfare have progressed rapidly. Why will our military friends keep on arguing on the basis of shaky statistics of a past era?

There have been enough real battles recently to give a foretaste of what aërial bombing might develop into, given our crowded centers and more equality in fighting strength. I refer to the war in the Far East, where Japanese bombers, practically unopposed, have wrought havoc. In Shanghai, the combined attack from land, sea, and air, with poison gases, smokes, shot and shell, resulted in total casualties of thirty thousand civilian Chinese (according to Chinese statistics and statements). In parts of Jehol, Japanese bombers raked the towns and cities with such dire effect that no living thing was left. Here again there was but little opposition. The Chinese have no aërial force to speak of, and only the limited amount of poison gas which they can import from Western nations, such as the United States, France, and Germany. In Latin American hostilities since the World War, there have been just sufficient success from aviation and poison gas to induce these impoverished countries to begin specialization in these lines, despite the handicaps of having no independent chemical industry, no trained personnel, and slight development of aviation. These are all straws showing which way the wind is blowing in preparation for the next

world war or European war. No definition will stop this use, for no definition is adequate. The use of poison gas is proven practical from experience. Poison gas has come to stay.

Summary and Conclusion

The definition of poison gas is as elusive as the gas itself. So far, no definition has been worked out which is drastic enough to protect the civilian population, inevitably involved in the air warfare of the future. Experience has shown that ratification of such a definition to prove definitely binding upon the signatories has never been achieved without reservations and lack of unanimity, both of which missing essentials nullify the effectiveness of the prohibition of poison gas in war as between nations. The use of poison gas in the past war was just the beginning of a more scientific and extended use should war be declared again. Industrial chemistry and research laboratory chemistry have been linked up with national defense plans under a national chemical warfare section to every army, every navy and every air service. This coördination of peace and war plans and activities and the convertibility of peace-time industrial plants into war producing units has been tried out in the Far East since the World War closed.

The conclusion is clear—neither definition of nor international agreements prohibiting the use of poison gas as between nations has been effective in the past and judging by the preparations for its use now being made, will be effective in the future. To suppose that this potential war of aviation and indiscriminate bombing with high explosives, poison gas, bacteria, and thermite is to be restricted to special zones or is humane for general dosage, is to believe fairy stories. The plea for the humanity of poison gas can be exposed next.

CHAPTER II

IS POISON GAS WARFARE HUMANE OR INHUMANE? WHAT IS THE DIFFERENCE?

MODERN wars are neither humane nor merciful. The more deadly in effectiveness, the better, is the joint attitude of the extreme pacifist and the extreme militarist. This coincidence in the common attitudes of the extremes on this question is again striking, especially when so few common points are otherwise reached between them. In reaching this same conclusion, however, two divergent paths of reasoning are followed. The logic of the militarist is: use every means of putting the enemy out of commission, regardless of international commitments. Humanizing modern war is a joke. However (say the militarists), it seems wise for various reasons to tell the public about the humaneness of each new weapon used.

The pacifist maintains: it does not much matter by what means you kill—a bayonet in the stomach is as bad as a good dose of mustard gas—if only the development of the horrors of war will wake up the sluggish average citizen to its widespread, useless devastation, involving all within its path, and hence to its futility as a means of settlement of disputes between nations. So neither extreme militarist nor extreme pacifist are interested in the “humaneness” of gas warfare. We are inclined to discuss it, nevertheless, first to expose the fallacious arguments of the exponents of gas warfare, and, secondly, to drive home again and again the inevitable inclusion of the non-combatant for whom severe casualties are destined within the battle area, in another war.

False and True Deductions from War Gas Statistics

Gas, as a new weapon during the World War, was found to justify itself immediately because of its effectiveness. More forceful are the words of the head of the American Chemical Warfare Service during the war, General Amos A. Fries.

"Chemical warfare, even under the inelastic methods of the Germans, proved one of the most powerful means of offense with which the American troops had to contend. To realize its effectiveness we need only remember that more than twenty-seven out of every hundred casualties on the field of battle were from gas alone. Unquestionably many of those who died on the battlefield from other causes suffered also from gas. *No other single element of war, unless you call powder a basic element, accounted for so many casualties among the American troops* [italics ours]. Indeed, it is believed that a greater number of casualties was not inflicted by any other arm of the Service, unless possibly the Infantry, and even in that case, it would be necessary to account for all injured by bullets, the bayonet, machine guns, and hand grenades. This is true, in spite of the fact that the Germans were so nearly completely out of gas when the Americans began their offensive at St. Mihiel and the Argonne, that practically no gas casualties occurred during the St. Mihiel offensive, and only a very few until after a week of the Argonne fighting. Furthermore, the Germans knew that an extensive use of mustard gas against the American lines on the day the attack was made, and also on the line that marked the end of the first advance a few days later, would have produced tremendous casualties. Judging from the results achieved at other times by an extensive use of mustard gas, it is believed that had the Germans possessed this gas and used it as it has been used a few other times, American casualties in the Argonne would have been doubled. In fact, the advance might even have been entirely stopped, thus prolonging the war into the year 1919."¹

Total American gas casualties (which includes those affected even temporarily) amounted to 70,752 men in the Army, out of total casualties from all causes of 258,338. This is a very high figure when it is realized that Americans used English gas masks, were trained in gas discipline by

¹ From *Chemical Warfare* by Fries and West.

French officers, and had the full benefit of Allied experience as a result of two years of previous gas warfare. Of these casualties (twenty-seven per cent of the total casualties from all causes) about two per cent actually died from gas effects. This figure does not include thousands who were both gassed and wounded. It does not include those thousands listed as missing who were also gassed. It does not include those thousands who, gassed during the war, died of gas effects since the war.

With these significant and mounting omissions, poison gas advocates claim on the basis of the above statistics that poison gas warfare is humane. With such loopholes in accuracy, the debatable conclusion has been reached that a man disabled by gas on the battlefield has twelve times as many chances of recovery as the man who is wounded with bullets or high explosives. Therefore, according to the advocates of poison gas, if you choose your gas in the next war, you will live, less maimed than if you were hit by bullets. Do avoid bullets and high-explosive bombs if you can. If, through your misfortune, you happen to be struck by a bullet or high-explosive bomb, also filled with gas (all such, from 75mm. up, will be so filled), you will add to the casualty statistics.

It was practically impossible to obtain accurate data concerning the number of casualties and deaths attributable to gas in most of the battle engagements because the conditions accompanying severe fighting allowed little opportunity for differentiation between those dying from the effects of gas and those killed by rifle bullet, shell, and weapons other than gas.² Astonishingly enough, it is on the basis of these

² Gen. H. L. Gilchrist, Medical Division Chief, Chemical Warfare Service, says in his book, *A Comparative Study of World War Casualties from Gas and Other Weapons*:

"Considerable difficulty has been encountered in obtaining reliable information from the French Government relative to the number of gas casualties occurring in the French Army for the reason that the French had never attempted to keep

unreliable figures that the main argument for the humaneness of gas warfare is built up. Hence it is not strange that the argument falls down when subjected to a searching analysis of the statistics involved.³

In discussing American gas casualties and deaths, we shall quote from General Amos A. Fries, head of the Chemical Warfare Service of the United States in France, as follows:

"In the past war more than twenty-seven out of every hundred Americans killed and wounded suffered from gas alone. You may say that many of the wounds were light. That is true; but those men were put out of the battle line for from one to four months,—divisions, corps, and armies almost broken up,—and yet the use of gas in that war was a child's game compared to what it will be in the future."⁴

Later General Fries explains clearly the reason for the low figures in gas casualties, a reason which the pro-poison gas writers never mention. "Unquestionably many of those who died on the battlefield from other causes suffered also from gas."⁵

a compiled record of gas casualties. . . . Figures have been obtained and, while not absolutely correct, they serve the purpose of giving a fair estimate of the casualties and mortality from gas in the French Army.

"The actual number of gas casualties suffered by the British forces is given . . . so far as this can be done with the information at hand. These figures must be regarded as an underestimate as, with the exception of cylinder attacks between December, 1915, and August, 1916, data are not available regarding the number of men killed by gas in the field who were not admitted to Medical Units, the number of gas casualties captured by the enemy, and the number of slight gas casualties returned direct to their units from field ambulances."—From Chapter II, "Casualties in the Different Armies."

³ And in the *Medical Bulletin of the Veterans' Administration* for January, 1933, in a special article by General Gilchrist, we read (p. 234):

"The British found that it was impossible to form an accurate idea of the number of casualties and deaths directly due to gas in this series of cloud attacks. A large number of men were killed outright by the gas, but deaths due to this cause were included in the casualty lists under the general heading 'killed in action.' The number of gas casualties in the early gas attacks was very great, because the troops had little or no means of protection."

⁴ *Chemical Warfare*, Fries and West.

⁵ In Gilchrist's book we read:

"From that time on, American troops were subjected to numerous gas attacks, but the casualties were light until June, 1918, when 6,318 men were hospitalized from the effects of gas exposure. From June to October, the gas casualties

Why were there so comparatively few American gas casualties? For two reasons: first, our American troops were exposed to severe gas attacks only from June, 1918, to November, 1918, but in those five months we totaled 70,552, or 27% of all our casualties, a rather sizable figure, averaging 3,527 per week; second, the German supply of mustard gas gave out in September of that year, so that for the remainder of the fighting (three months), lethal gas attacks lessened considerably. The Germans claim that a different result in American casualties, with quite different statistics, would have been shown if the chemical raw materials necessary for the manufacture of mustard gas in Germany had not given out. On the basis of such statistics the plea of the humaneness of gas warfare is of very doubtful validity. It was chance that kept our figures low, and not the "perfume of poison gas," as one poetic Senator (who had never been near the front) expressed it.

Gas casualties in the French Army were estimated at 190,000; those in the British Army, 180,000; the Russian records are incomplete. Those who are pro-gas estimate low; those who are anti-gas guess high. It is largely guess-work, however. It has been recorded that three gas attacks by the Germans resulted in over 20,000 Russian casualties in one engagement. The Germans admit 75,000 gas casualties in one Russian engagement, and the number was probably considerably greater than that. The figures given are most conservative, for some writers have estimated that the Russians alone suffered in the neighborhood of one-half million gas casualties.

While the total number of casualties caused by gas is not accurately known, it is conservatively estimated at 600,000.

increased very rapidly, the two largest months being August and October, during which months 36,289, or 51 percent, of our total gas casualties took place."

A Comparative Study of World War Casualties from Gas and Other Weapons, pp. 16-17.

This is rather good for a new weapon, used for only two and one-half years, subject to ignorance both of how it should be handled and of its effects, and at that time dependent upon weather conditions; so good, in fact, that air, naval, and military authorities, usually so set in their ways, are finally "sold" on poison gas as an effective weapon in war. It will be interesting to note the size of the forces that caused this tremendous number of casualties. The maximum of gas troops engaged in actual service at any one time by the principal nations engaged in the last war was approximately 17,000. In addition to the special gas troops, the artillery was the only other agency using gas, except for the use of some few gas grenades by the infantry, which may be disregarded.

The total number of gas shell manufactured and used by the principal nations was approximately 58,000,000. This figure seems to be somewhere between five and ten per cent of the total artillery shell used by these nations. It is, therefore, essentially correct to state that all gas casualties were caused by about 17,000 gas troops and the artillery gas shell mentioned above. Thus approximately 17,000 gas troops and between five and ten per cent of the total artillery shell caused well over one-half million of the casualties in the armies engaged. Certainly this illustrates very powerfully the effectiveness of chemical warfare on a comparatively small scale. Today, with well organized gas divisions, another story could be told.

In interpreting this data it should be borne in mind that the 17,000 gas troops did not serve for the duration of the war, the number being increased to the maximum mentioned as the war progressed. Furthermore, the power of the real chemical offense is shown when it is realized that certain of the chemical agents used were very ineffective. For example, the German blue cross shell, of which 14,000,000 were manu-

factured, were almost a total failure as regards their gas content, although they did have a heavy charge of high explosives which had effect. This experimentation and failure consumed valuable time, a procedure which has since been obviated by government-supported researches carried on during peace. Now each chemical-producing nation is prepared for quantity production of irritant and lethal gases on a forty-eight hour warning. Today each regiment and each battalion have specially instructed gas officers. (See Appendix III.)

The totals in actual men instructed in gas warfare are dependent on the size of the expanded army, but of this one fact we can be sure,—that a large standing army of today has more gas officers than the total for all armies during the World War.

The competitive researches in poison gas technique and the great increase in personnel trained for this work since the war assure those of us who have studied the problem that its use now or in the future allows for no question of its benefiting humanity. Its effectiveness depends upon surprise to vitiate defense, and concentration to annihilate. Both are assured the unprotectable civilian within the bombing area.

Government Support for Gas Factories Disregards Humane Plea

Today that conclusion stands unchallenged in the light of the unceasing development of chemical warfare. The war poison gases are being tested in the major countries on animals with respiratory tracts similar to those of human beings, so that statistics of modern gas effectiveness are commensurable. "All nations today are strengthening their chemical arms and are conducting research continually, looking toward supremacy in chemical warfare," said General

H. L. Gilchrist, Chief of the Chemical Warfare Service of the United States. Supremacy in chemical warfare; the relentless competition between scientists of all nationalities, each in his laboratory, to develop more and more deadly gaseous effects; war as a branch of applied chemistry—that is the situation today, unemotionally stated.

Applied chemistry implies that there are sufficient chemical laboratories and industries behind each national border to supply the government with poison gas if and when hostilities commence. Such has been the development of the chemical industry since the war. Two actual trends have been developed. First, government subsidies, either direct or indirect, to the chemical industry have been made. Quoting from the report of the United States Department of Commerce, Bulletin No. 813, an example of direct subsidy and direct government support of strategic chemical units is obvious. (Name of state omitted for all chemical-producing states are doing the same thing.) "The fact that the State will not allow key chemical industries to perish, but will intervene at critical times, has been proven over the past two years in the case of dyestuffs, boric acid, sulphur, bergamot, oil, bromine, phosphorus, iodine and other industries. State aid in the dyestuffs industry took the form of assistance in obtaining banking support at the time of the reorganization of the . . . in 1931. In the case of boric acid an important direct subsidy of one million . . . annually over a period of fifteen years was granted the . . . Remission of taxes, favorable leases, and assurance of purchase at a fixed price for the finished product were accorded the nascent bromine, iodine and phosphorus industries. The State appropriated four million . . . annually over a period of six years to cover the liquidation of accumulated sulphur stocks last July, and in October provided five million . . . to withdraw a stock of 350,000 pounds of bergamot oil from

the market." There is an excellent example of direct and indirect subsidy to strategic chemical units, all important in the production of chemical warfare. Add to these measures the high tariff wall around each nation which protects and artificially stimulates the chemical industry inter alia and one can see plainly written on the wall this dictum—we nations in case of war are going to use poison gas and all forms of chemical warfare whether humane or inhumane.

Secondly, the marked tendency, started during the war, of emphasizing by every means possible, the commercial chemical development and its convertibility to war use has continued to this day. Since the World War, especially, the nationalistic chemical expansion has been very marked. The following nations have well established chemical factories, capable of producing some form of poison gas necessary for chemical warfare—Great Britain, Germany, France, Italy, Belgium, Netherlands, Switzerland, Norway, Sweden, Czechoslovakia, Spain, Poland, United Soviet Socialist Republics, Yugoslavia, Austria, Hungary, Bulgaria, Greece, Rumania, United States, Japan. Many of these countries have also government chemical laboratories where research in poison gases and contacts with industrial laboratories are maintained. This is a tremendous expansion if compared with pre-war days. It must be clearly understood that this expansion in chemical activity around the globe and intensified within each nation is not all for the purpose of conversion into war purposes. There has been a great stimulation in the demands for varied chemicals since the war which has nothing to do with convertibility into war uses (though I understand that even the vastly expanded cosmetics factories could furnish some excellent chemists for the gas service). The point to be stressed is not so much that Germany has 470 chemical factories, Bulgaria 117, Austria 598 or Italy 926, etc., but that certain

chemical factories which growing industry in each land requires are easily convertible into production units for poison gas or other forms of chemical warfare (smokes, explosives etc.). These factories are protected in every way by the respective governments as part of their war program (defense or offense, there is no difference today since aviation has come to stay). The question naturally arises—which industrial chemical factories are convertible into chemical war uses of various kinds? To list a few is instructive—to enumerate them all would be alarming. All the acid-producing factories—(acetic, boric, citric, hydrochloric, hydrofluoric, nitric, phosphoric, sulphuric, tannic); all the alcohols, (amyl, glycerine, methyl), methyl acetone, acetate of lime, ammonium, bleaching materials (chlorine, bisulphites, hydrogen peroxide, hypochlorites); the calciums (arsenate, carbide, chloride, phosphate), copper compounds, cyanides, formaldehyde, leads, magnesium, sodas (benzoate, bichromate, soda ash), sulphides and sulphites, etc. The development of this industrial activity within the nations makes a fascinating study. For instance, within twenty-five years (1900–1925) the chemical industry in the United States grew from an insignificant beginning and a long, very slow infancy (up to the World War the American chemical industry was far down on the production list) to a production capacity of chemicals and allied products valued at \$2,278,000,000. The three major American chemical companies,—the Allied Chemical and Dye Company, E. I. Dupont de Nemours, Union Carbon and Carbide, total together, today, according to Dr. Theodore Switz, twice as large in industrial investment and output as the I. G. Farben Industrie of Germany or the Imperial Chemical, Limited, of Great Britain. This commercial growth of the chemical industry despite the setback due to the world-wide economic depression, is bound to continue, for we are still at the

threshold of our chemical knowledge and science and its application to industry and health. As each of these major industries need and have laboratories for research, their ready integration into war gas producing programs is foreseen. This is no question of humanity—it is modern industrialized warfare. For instance, the United States is zoned for chemical military preparedness into five main districts; each district contains a certain number of chemical factories, prepared to produce a certain specified quantity of poison gas in case of war. The United States is not the only nation so chemically prepared. All chemical-producing nations have followed suit. The integration of this chemical war preparedness with industrial war preparedness is intimate. That is modern warfare.

Debunking the Publicity Campaign for the Humaneness of Gas Warfare

Another argument for the humaneness of modern warfare must here be disposed of. In issues of recent periodicals, both here and abroad, there have appeared inspired articles trying to show that modern warfare is much less deadly than old-fashioned war, and asserting on the basis of distorted figures that the tendency in modern warfare is toward gentle, humane struggles between nations. For instance, "Debunking Mars' Newest Toys" is typical of the worst of these articles. We quote from this article by Thomas R. Phillips:

"The doughboy in France fought in the safest great war in history. In the Meuse-Argonne, with 1,000,000 Americans in battle, 18,000 were killed in eighteen days of hard fighting, or about one soldier out of each 1,000 engaged a day. At Gettysburg, the most deadly battle of the Civil War, 2,834 men from the Union Army were killed in three days of fighting with approximately 82,000 engaged, or about one out of each eighty-seven a day. Storming Bunker Hill, one of each eleven British soldiers was killed, in their three charges. In 216 B.C., 8,000 Romans, out of an army of 76,000 lay dead on the field after the battle of Cannæ;

one-seventh of the Romans of fighting age had been slain in a single day.

"Modern war, like all war, is unpleasant enough, but compared to ancient war, relatively safe. The old warfare where men clashed in hand-to-hand combat resulted in the death of one or the other; the defeated escaped only by the speed of their legs and the strength of their lungs. Now they hide behind earthworks and thumb their tables of logarithms to get the data to lay their guns and fire on their enemies.

"As guns have improved, they have, like warfare, become less deadly. This seeming paradox is due to the fact that soldiers hide from weapons they cannot face without dying."⁶

Each war becomes, according to this, more humane, less deadly. Soon we shall have some perfume on the air and a few shots, and that will be called a war. Such is this author's logical conclusion,—actually.

The number of people engaged in war increases with every war. There were 3,905,999 soldiers engaged in the Civil War. The total casualties, wounded and dead, were 618,258. The proportion is 15.8%. Mr. Phillips' argument for the humaneness of war is based on a single battle. The foregoing figures for the Civil War as a whole tell another story.

As for the World War, the total number of combatants engaged was 65,038,810; the total number of casualties—wounded, missing, and dead, is 37,494,186. The proportion of the latter is 57.6%. It is utterly disproportionate to say that such figures as Mr. Phillips publishes establish the relative humaneness of modern war.

Now let us go back to those statistics of antiquity which are so glibly quoted to prove how much more terrible old-fashioned wars were than war is today. Plainly speaking, there are no figures from 216 B.C. even down to 1400 A.D. that are reliable, or worth anything as war casualty statistics. Mr. Phillips could have doubled his figure for the dead on

⁶ *Saturday Evening Post*, March 4, 1933.

the field of Cannæ and none could authoritatively object. This tendency, noted again and again, to base the plea for the humanity of modern war on questionable statistics, must be stopped by facts.

For instance, on the basis of figures for one single incident in the Civil War, which he carefully selects, Mr. Phillips tries to prove the high mortality percentages for the whole four years' campaign. This is obviously unfair, and results in conclusions which are untrue. If he wishes to quote or compare statistics of Gettysburg with the Argonne, he must compare on the basis of comparative values—the whole Meuse-Argonne campaign with the whole campaign of General Lee's advance from Harper's Ferry to Gettysburg and back. That comparison would tell a different story, showing how much deadlier the Meuse-Argonne fighting was than the Gettysburg campaign. For instance, taking one battle: the Canadians lost 18,000 men in Sanctuary Wood out of 80,000, an average of one out of every four men. These single instances could be quoted endlessly from the statistics of the individual battles of the World War to disprove every statement that has been made that modern war is less deadly than the wars of old. Surely Mr. Phillips and his kind never went overseas to fight in the first line trenches of the World War, or he never could have written, "Now they hide behind earthworks and thumb their tables of logarithms to get the data to lay their guns and fire on their enemies." That is rot.

Furthermore, it is well known that humaneness is not considered within the battle area. In a future war, it will be considered necessary, in order to achieve victory, to cripple important industrial centers, with large populations inevitably involved. Such action will endanger millions of civilians formerly considered as non-combatants. A far greater proportion of the population is liable to extermina-

tion and serious casualties from deadly airplane attacks than were involved in past wars. The airplane (whose rôle is to be discussed in detail in Part Two) will be important from every point of view, but it is not the only means of discharging poison gases. Today the ballistic engineer, a new professional worker whose goal is the efficient proportion of gas and explosive in shot and shell, from the 75mm. to the two-thousand-pound bomb, is busy in every munitions-producing country developing new combinations of filling-in gas in shot, shell, and bomb, whether sensory irritant (such as lachrymators, vomiting gases, vesicant gases), or lethal gases, and differing proportions of high explosive, to achieve the purpose of wide-range dissemination and concentration of gas and the explosive together. All such investigation and research in preparation for surprise attacks, whether within army, naval, or aviation departments of the respective governments, are predicated on the plea of self-defense.

Today's Goal: Concentrated Poison Gas—Humane or Inhumane?

Concentration of poison gas on the shelled area is all-important for effectiveness. It is achieved through favorable weather conditions and a concentration of bombardment through the use either of artillery or of bombing planes, Livens or American projectors, Livens drums, cylinders, hand grenades, etc. Under favorable conditions, aided by the increasingly mechanized army, concentration of gas clouds to any degree desired is guaranteed. This study is diligently pushed in all military aviation schools and military laboratories. (See Appendix IV.)

Toxic gas clouds rise on an average to a height of thirty feet above the level of the ground, but sink down into all openings. Instantaneously the thought flashes into our minds: If this is so, why cannot all of us run into the high buildings

when such an aërial gas attack starts, where we can be safe and sound?

The impossibility of housing a city's terrified millions in a comparatively few skyscrapers is obvious, and even if possible, would be of little avail. The aërial attack of the future will not be confined to gas alone (a fact which must be constantly recalled to the statistical experts who would prove its humaneness), but will also include explosive and incendiary bombs. Where will your sky refuge be then? Toppling over into a crashing heap, burying all within and those immediately without.

Unfavorable weather conditions are being largely overcome by intense research in new gases which are particularly effective in damp, foggy weather, as phosgene proved during the war. Wind directions are carefully studied and made use of, and seasonal changes have been carefully considered before war is declared. It is significant for the future use of poison gas in warfare that every war in the last hundred and fifty years started in the spring or the summer (with only one exception—the War of Liberation, 1813–1814, which began in February). For dry weather, either warm or cold, there is none better than mustard gas, whose concentration can be nicely adjusted to the use required: for a sensory irritant, one part in four million parts of air; for lethal effect, one part in four hundred thousand of air. So runs the gamut of concentration for most of the known gases. The problem of desired concentration of gases lessens with experimentation and the increased knowledge of the gas officer. It is controllable through gas emission and adjustable to weather conditions.

The Navy's interest in the interrelationship between the expanding chemical warfare and its methods of concentration and dispersal over ships must naturally be very intense. The problem of poison gas and its effect on battleship con-

struction and personnel has been carefully studied. The explosion of a few high-explosive lethal gas bombs over the largest warship renders that ship, costing many millions, utterly useless. Besides the calculated effect of the high explosive, the lethal gas thus liberated will be sucked through the ventilation system of the ship and reach, on its deadly errand, every man aboard. In the midst of a terrific bombardment, when every man is working with steady concentration, who knows when he is in the presence of an odorless, persistent lethal gas? If the ship survives the explosive bombardment, in a few hours the men, whether with masks or without, will fall victims to the new gas and so will be useless. Have naval officers sufficiently explored the imposing obstacles to careful range finding and intricate mechanistic adjustments with gas masks on? Have their honest conclusions been sufficiently broadcast to naval personnel?

The humaneness of gas warfare as applied to naval encounters is roundly questioned. Indeed, naval officers, admitting the important part which wind and weather play in gas warfare, emphasize its increasing usefulness in naval warfare while detesting its ruthlessness.

Gas-and-explosive-filled bombs will be dropped on enemy ships from bombing airplanes launched by airplane carriers or from the warships' decks. There are other means which have been devised by naval authorities to disperse poison gas and smokes, such as torpedoes launched by airplanes, rendering the large battleship useless, putting the scout cruiser in danger, and subjecting the crew of even the submarine to the double death-trap of the liability of being gassed while drowning.

Thus the Navy is vitally concerned with the whole question of chemical warfare. Cognizant of future possibilities, the General Board of the American Navy reported in 1921 to Secretary Hughes: "The General Board believes it to be sound

policy to prohibit gas warfare in every form against every objective, and so recommends."

Then, too, the use of smokes will afford another field in which ingenuity can have full play if based on knowledge of materials and weather conditions. Smokes are used in two distinct ways. As a defensive screen, day and night, smokes without gas mixtures are invaluable for hiding the movements of ships or armies; and, secondly, smokes can be mixed with poison gas which will cause casualties among the enemy troops and ship personnel.

It was soon found, during the war, that white phosphorus, a solid which could be dispersed from artillery shells, bombs, Stokes mortar shells, grenades, and candles, was the most efficient for the purpose. White phosphorus will keep on burning when the individual non-atomized lumps fall on the ground, on the ship, or on flesh. Hence it fulfills the double action of a good screening and an excellent agent for producing casualties and terror.⁷

The value of smoke is now being appreciated in the chemical warfare of the future. "Every smoke cloud will be poisonous or non-poisonous at the will of the one producing the cloud, and this will be true whether it is produced from artillery shell, mortar bombs, hand grenades, smoke candles, or other apparatus" (Fries). If this uncertainty as to the probable content of a smoke cloud is extended to cover its use "on every field of battle, by every arm of the service, and at all times of day and night," one can visualize the conflict of the future in no uncertain terms.⁸ An airplane of the type of the Martin bomber can lay a smoke curtain

⁷ "In the Navy, smoke screens laid down by smaller ships give the larger ships a chance to manœuvre for position and range. These screens were established for the purpose of cutting off the view of the enemy submarines or other vessels, thus allowing merchant ships or even warships, when injured or out-classed, to escape."

⁸ "Heavy bursts of white phosphorus from Stokes mortars not only blot out observation but also produce serious casualties from the burning phosphorus, as well as a terrorizing effect."—*Army Manual*.

about 1600 yards long. How many airplanes are needed to isolate completely a city whose circumference is so-and-so many yards with an effective poison gas smoke screen while enemy planes of the big bombing type drop high-explosive lethal gas bombs? It reminds one of the arithmetic examples of the days of our youth.

Smoke may be used to mask concentrations of poison gas, to cover construction work undertaken in the face of the enemy, to upset the enemy's fire by placing smoke screens directly in his vision, or to cover river crossings, etc. Other smoke-producing chemicals, such as sulphur trioxide, oleum, titanium tetrachloride, and zinc chloride, have their uses. All can be combined with poison gases so that, whether so mixed or not, the wearing of the gas mask is the better part of wisdom. The variations in the mixtures render the possibilities for surprise so obvious that the smoke cloud of the future will be thoroughly distrusted. This, again, is not a question of humaneness in warfare. The military problem is to break the will of the enemy people, regardless of means or consequences. Territory behind the lines is more strategic than the front line trenches. Non-combatants must be stopped from war work.

At international conferences army and navy officials, foreseeing these possibilities, have tried to make known their objections to chemical warfare as used by other nations than their own. This measured stand is taken with the full knowledge of the facts concerning smokes and irritant and lethal gases.

Summary and Conclusions

Thus, from the air, from the land, or from the sea, poison gas and explosives will be rained upon the unprotected civil population should another major war occur. That thought should stir the statesmen and the people who work at Geneva

as well as in their home capitals toward a determined stand for drastic reduction of all armaments as a means of abolishing all war. That thought should also penetrate into the heart of the peoples. Do we or do we not want to be massacred wholesale for the settlement of disputes between nations which today can be settled by constructive means?

With succeeding disarmament conferences, however, each limiting to a greater degree the land, sea, and air forces, the convertibility of peace-time industry and chemistry and of peace-time aviation into war agencies will become successively more important, and development in these fields will proceed unhampered by international agreements. In his book, "Aërial Bombardment," M. W. Royse makes the challenging statement, based on historical fact,

"At no time . . . has the effective operation of vital weapons been limited by international regulations."

If such vital weapons as poison gas, poison smoke, cannot be limited or controlled by international regulations, then, indeed, the civilian must wake up to his share in the responsibility for their continuance. The plea of their humaneness must be outlawed.

The late Marshal Foch, who led the Marne defense, a warm-hearted soldier, proficient, magnetic, untiring in studying the modern tendencies of warfare, predicted this type of chemical warfare.

"Poison gas bombs spread deadly vapors which penetrate every mask and bring almost instant death, inextinguishable phosphorus bombs burn through the flesh to the bone in a few minutes. There are hundreds of tanks, each one of them able to spit out thousands of fatal shots per minute; machine guns, light automatic guns, which, in the hands of millions of men, can scatter hundreds of millions of bullets per minute. And, above all, this horror in the sky, darkened with thousands of airplanes, from which destruction pours on the earth. But that is not the whole picture: behind the lines, towns and villages fall in flaming ruin beneath shell fire from guns and airplanes."

Indeed, the civil population, far from being immune, will rather be the main objective, according to a literary major in a European army, especially in towns, cities, and industrial centers. "They will be massacred by gas bombs from thousands of airplanes (the number of planes necessarily decreasing as the deadliness of the lethal burning phosphorus and smoke released increases) and peace will be concluded only over the dead bodies of the enemy nation."

The conclusion leads us to face the facts squarely. Concentrated poison gas attacks from the land, sea, and air are not going to be modified for the sake of humaneness. The art of the military demands the attainment of the goal, regardless of the sacrifice. The goal is to cripple the will of the enemy as thoroughly and as quickly as possible. The "will" depends on the soldiery plus the people back home who manufacture the implements of war. Poison gas must be used, for it is ideal for mass destruction. Mass destruction means you and me.

CHAPTER III

WHAT HAS BEEN GOING ON SINCE THE WORLD WAR FOR PERFECTION OF MASS MURDER?

HERE we tread on dangerous ground, trying to steer a middle course between the Scylla of military secrets closely guarded for so-called national defense, and the Charybdis of sensational stories appearing in the press. This desired middle course can be here achieved without undue revelations of truth or undue stretching of the imagination.

A new gas which makes you weep uninterruptedly for a week (bromobenzyl cyanide) has been found practicable for quick and cheap manufacture. Have you ever had the experience of a slight tear gas attack? Terrifying as this is, the thought of exhausting tear ducts for a week or more opens the probability of a half-blind or wholly blind civil population, stumbling about, trying in vain and with widespread discomfort to carry on difficult technical and mechanical jobs intrinsically connected with modern civilization. "Man is one thousand times more susceptible to tear gas than the horse, and ten times more susceptible than the dog" (Farrow).

Gas Research in Government Laboratories for Self-Defense

Persistent lethal gases have been much improved since the war as part of peace-time manufacturing processes and through new research developments, although mustard gas remains the king of poison gases. For instance, the mysteri-

ous Lewisite, heralded at the close of the war as a lethal gas more effective than mustard gas, must be reckoned with. Lewisite, a mixture of acetylene gas and arsenic, is, in the pure state, a colorless, oily liquid, with an odor (so poetic waxes the military manual) like geraniums. Its chemical name is chlorvinyl-dichlorarsine; its boiling point is 190°C . and freezing point 18°C . Assured by the chemical contents and the experience of those who know, Lewisite can be counted on in any future conflict to take an equal share with mustard gas of casualties and deaths. The whole field of the arsines (particulate gases) and their compounds have still to be fully developed, and here is a prolific field of new poison gases.

There is ample evidence and assurance that government chemical laboratories in all chemical-producing countries are busy evolving new poison gases and new, unknown mixtures to startle the world in case of an outbreak. This chemical activity amounts to an unceasing competition, and develops of necessity an international spy system for chemical secrets.

Chemists and military experts assure one solemnly that no new gases acceptable for war uses can or will be discovered. But regardless of nationality, experts invariably continue with the following remark, "However, we are pressing our chemical research for purposes of defense, and who is there to question our right to do that?" No one questions the right of preparing for self-defense, but everyone has the definite right to ask, "Where is the dividing line between preparation for offensive chemical warfare and defensive chemical warfare?" There is no dividing line. Mustard gas is as effective for one as for the other; Lewisite is as good for one use as for the other. If this is true, then the competition between nations in their chemical warfare research, either under direct government control or indirectly through the

unnatural stimulation of the chemical industry within their borders, or through university connections, will lead to disaster for all involved, in case war should break out.¹

It has been a well-defined policy in this discussion to keep away from the sensational, from the non-factual. The line of fact and truth has steadily been adhered to. In all lands, however, there have appeared such fantastic tales of what the next war has in store for us that a sample of the mixture of truth and imagination is here given for the sake of showing how the nations, although chemically armed, fear the research and practical development of chemical warfare in other nations. This fear psychosis has spread itself to the sensation mongers and through them to the helpless peoples, and is spread by European periodicals against American chemical inventions, and by American periodicals against European research,—continent against continent, as well as nation against nation. The commercial firms selling supposedly protective gas appliances are the only ones benefiting from this inspired press campaign.²

¹ Major Charles C. Hillman, of the U. S. Army Medical Corps, in an address to medical field service students in 1931 on the Care of Gas Casualties, drew the following conclusion:

"Although the United States Government does not contemplate the use of toxic chemicals as an instrument of offense in war, the decision as to their use may not be left in its hands. There is no doubt as to the power of chemicals to produce casualties. General Malone, in reporting on the experience of the 23rd Infantry before Château-Thierry, said, 'It would appear that, expressed in numbers of shells only, the gas shell has been approximately nine times as effective as any other form of projectile in producing casualties.' With such an efficient weapon, and with the possibilities that are offered for its effective use by aviation as well as by artillery, it appears illogical to assume that poisonous gases will not be used in future wars. It behooves us, as medical officers, therefore, frankly to face the problem and make suitable material and mental preparation to meet the issue."

This opinion is shared by all the chemical warfare experts of the various nations with whom I had the privilege of speaking at the time of the opening sessions of the First World Conference for the Limitation and Reduction of Armaments.

² Here is such a sample of truth and fiction, badly mixed, but effective in the mixture:

"The American Chemical Society, visiting Edgewood Arsenal, Maryland, recently got some new light on what may happen in the 'next war.' They saw the new tools evolved for human destruction, saw an airplane lay down a smoke-

Since the war, developments in research of poison gases have taken the two paths,—one of completing and perfecting the gases known and used during the war, and the other of watching for and developing new gases. For instance, the effects of the blue cross shell have been increased considerably since the war, the gas (so called from its shell marking) which, according to Dr. Julius Meyer, in his book, "Der Gaskampf und die chemische Kampfstoffe," had the following effect during the war:

"Even a few grains of diphenylchlorarsine per cubic metre caused almost unbearable pain. . . . The inhalation of this substance also led to serious resorptive effects on the nervous system which revealed themselves in motor disturbances, unsteady gait, swaying, inability to walk. This was accompanied by severe pains in the limbs and joints. The inhalation of a very high concentration often induces numbness, fainting, and unconsciousness which may last for several hours. Disturbances of the digestive organs have also been observed, accompanied, in the case of human beings, by a very marked loss of weight."

Here, obviously, is a gas which with some improvements, made since the war, would be very useful for immediate effect on an army or even in a munitions factory or crowded city where complicated and almost automatic machinery would do the rest to the prostrate humans.

screen across a wide field in a few seconds behind which troops could move unseen, and visited the laboratories where invisible death is stored.

"And almost at the same time, General E. A. Ross, doctor, chemist, and soldier of the World War, was telling the Canadian House of Commons what chemical warfare means:

"'Three drops will kill,' said General Ross, mentioning a new gas, which causes the lungs to fill with water, and rots the walls of the blood vessels. 'It is a gas against which our masks would be no protection whatever. One part of this gas in 10,000,000 parts of air will put a man out of action in one minute. It was tried on a herd of goats, and it killed all but four. Two planes could carry enough to destroy the population of London.'

"He went on, telling of cacodyl isocyanide—a chemist could almost write the formula from the name—one breath of which will kill; of another gas which penetrates the skin without harm and then acts like strychnine, only far worse. He told of thermite, which develops a heat that melts iron like wax.

"While such things are in store for the 'next war,' the rules of the great nations are doing practically nothing to preserve peace."

From *Labor* (Washington, D. C.), April 18, 1933.

An outstanding Swiss chemist, Dr. Gertrud Woker, tells graphically about the new gases:

"Finally, to this group of war poisons must be added cacodyl isocyanide, $\text{As}-(\text{CH}_3)_2\text{NC}$, a highly toxic substance, one breath of which (in full concentration) would prove fatal. As in this compound, in which the blue cross penetrating power is combined with the toxic properties of the isocyanic group, a change in the molecule can increase the toxic effect even from the pharmacological point of view and introduce into the materials of modern warfare other qualities of importance from the point of view of chemical warfare. On the other hand, the desired mixed effects can be gotten by a combination of different gases. It is also obvious that military chemists will not ignore other organometallic poisons, such as lead tetraethyl, $\text{Pb}(\text{CH}_3)_4$, and the extremely toxic diethyl telluride, $\text{Te}(\text{C}_2\text{H}_5)_2$, which can penetrate the skin without injuring it and, according to Professor Zangger, have a toxic effect which is much, perhaps a hundred times, greater than that of strychnine. This effect consists in terrible convulsions leading to immediate death or, in the case of lesser concentration, to chronic degeneration of the brain. It is well known that the manufacture of lead tetraethyl also sent up the world price of bromine (a necessary intermediate product in the process, but also one which is essential in medical science) to four times the previous figure in a few months and cost the lives of all thirty-eight workers in a factory in New Jersey. Here, just as in the case of substances for combating pests, where useful characteristics may be possessed by substances which are not dangerous to human life, the needs of chemical warfare must be a determining factor for their mass production even in peace time, and for the possibility of conversion to the manufacture of poison gas in case of war. In the case of lead tetraethyl and diethyl telluride, at any rate, it should be noted that their introduction into standard oil means that the petrol, which is one of the substances used in incendiary bombs, is at the same time highly toxic, and this is only one of the many combined effects used by modern chemical warfare."

So the preparation for poison gas warfare proceeds at a steady pace, the methods of protection for the civilian population, who will be among the main sufferers, always limping after the new inventions. These new inventions for mass destruction are continuing as quickly as human ingenuity can think them up, and as endlessly as there seems

to be need for them. Just a few should be mentioned here, not for the sake of sensationalism (which we are studiously trying to avoid), but to show the tendency of modern warfare. To properly measure this field is to measure science in all its phases. This is here impossible. Therefore only a few selections will be made to show the general trend.

Thermite Bombs

There is the thermite bomb—a very interesting new bomb, with manifold possibilities. Thermite is a mixture of aluminum powder, iron oxide, magnesium, and, for ignition, a detonator or heat (fire or match, etc.). These ingredients, mixed in the proper proportions, are packed in small bombs, a good-sized bombing airplane carrying a hundred or more. These can then be dropped over the enemy territory, choosing the most crowded sections for greatest effect, but without needing a direct hit or definite target. Wherever these bombs land an inextinguishable fire is started. (In fact, the magnesium continues to explode even more violently as either water or a chemical extinguisher is thrown upon it.)

If enough thermite bombs are dropped, a city can be quickly set on fire, burning unchecked in different sections at the same time, rendering the populace desperate, homeless, and terrified. Add some gas bombs at the same time (deadly phosgene would be advisable in this case, though mustard could be as effectively used), some high explosive to topple over the skyscrapers, and the picture of modern warfare for modern crowded cities is before your eyes. Every city in Europe is open to this form of attack within the space of a few hours in case war should be started. Every American city on the Atlantic seaboard is open to the same attack, even if the start of the enemy airplanes from the other side is known. That is the lesson from the flight of the Italian bomb-

ing squadron led by General Balbo to the United States in the summer of 1933.

To conceive of a war between the United States on the one hand and a united Europe on the other is to conceive of utter folly; to conceive of a war between the United States alone and a Far Eastern nation is also utter folly. Then against whom is the United States arming at the rate of half a billion dollars a year?

Other inventions could be enumerated ad nauseam to prove the deadliness to all involved of war today. One can't resist naming one or two more authentic inventions in the hope that, if reason will not persuade, horrors will.

Recently an inventor has been making the rounds of the important capitals showing the ordinance departments a new armor-piercing bullet which makes of the modern, heavily armored battleship a riddled mass of steel; the modern armored tank becomes as a sieve through which daylight pours in, and the airplane engine, although carefully protected, is shot through in mid-air. The uses for this new armor-piercing bullet are, of course, innumerable, and, be it remarked in passing, it is sold to each country in turn for use on the enemy. This vicious circle is one in which inventors and munitions makers are equally caught, because (with the exception of Soviet Russia) there is no control by the respective governments of the munitions factories within their national boundaries, and no international pledge, backed by penalties, between governments to control the use of such weapons. This competition in armaments must end, if unchecked, in annihilation within the battle area.

Electricity

An electrical engineer has worked out a scheme in his enforced leisure moments of charging the steel tracks on which all-steel trains are run with such a strong electric current

that the passengers are all death-trapped. This would work admirably on the international railroads if the proper alignment of enemy forces were situated on that road. This field of the use of electricity for deadly effect in war is filled with great possibilities for producing hysteria in peace time and destruction in war. "Death rays" have been reported from various countries, whether or not truthfully, possibly as scare-heads. Electric and radio control of airplane engines has been tried. Ingenuity and inventiveness have here a wide field to be explored. One significant development in all this maze of discussion, proposals, and denials, must be pointed out, namely the continued spread of electric power stations throughout the world, the carefully planned routes of power lines—either along strategic railroads or frontiers, the encouragement of "giant power" in industry and in the home. Harnessed for peace users, electricity is a great, mysterious, helpful force. Let loose in war by reckless men, its powers for destruction may be potent,—much more potent than, for instance, in its initial use in the World War when electric currents were run through barbed wire entanglements.³

³ A scientific view of electrical effects upon the human organism is the following:

"There is plenty of evidence that all kinds of physiological activities in the human organism are started by slight incidence of agencies such as chemicals, or temperature changes, or 'x-rays,' which in themselves involve far less energy consumption or content than the complex body changes which they start or, to use a word rather loosely, which they 'catalyze.' We can now produce, or better, stimulate, energy changes at a distance in various forms of electrical conduction or transmission and in wireless. What transpires at the receiver end of such transmission depends upon the chemical, material, or mechanical orientation of conditions there. It is difficult entirely to exclude the possibility of the human organism acting as such a receiver to some form of ether or 'non-wire' transmission, with destructive effects to the receiving organism. If I may be pardoned for generalizing so broadly, one of the characteristics of the results of modern investigations into electrical and allied phenomena is the very specific nature of the effects of different types of discharges or wave lengths, varying on a scale which includes light, heat and specific chemical change. Can we rule out physiological effects on man as a possibility? The inclinations are to the contrary."

From an address by Major Lefebure, August 24, 1929.

Improvements in Existing Gas-Dispersing Agents

The improvements in construction of bomb propellers to make their aim more sure, or in the new tanks, running on land and in the water, spitting gun-fire and gas at the same time, or in the new long-distance guns, firing seventy-five miles now, or in the new anti-aircraft guns which revolve automatically with the approaching sound of enemy airplane engines, reaching their fire up fifteen thousand feet, or the new Vickers predictor, a machine which calculates the speed, course, and height of invading planes (if only the planes run a steady course) and electrically transmits this information to the anti-aircraft guns, or the soundless Maxim airplane engines and new steel alloy for planes, or the new plans for armor-plating the planes, or the new sky searchlights to detect approaching planes, or new wireless control of airplanes, or the new courses in military training in schools, colleges, and government colleges to prepare our youth for all this: all these things need not be discussed in detail here. Let us merely note in passing that the rôle and development of the anti-aircraft gun is of no avail.

Brigadier-General P. R. C. Groves, Director in 1918 of British Air Operations, writing in 1922, said, in connection with the uselessness of anti-aircraft gun protection and hence of its development:

"It may be argued that it will be possible to protect the great cities by means of anti-aircraft defenses. The following considerations will show that that view is fallacious. In 1918 the London anti-aircraft defenses consisted of eleven specially trained night-flying squadrons of aëroplanes, 180 guns on the ground, in addition to a number of guns mounted upon motor vehicles, ten balloon aprons, and a large number of searchlights. The number of aircraft was nearly 300, and the total number of men employed 30,000—that is, the equivalent of two divisions of infantry. In addition, there were a number of specially prepared night landing grounds, extensive telephone installations, and a large headquarters staff to co-ordinate and direct the whole defensive organization. Great as was

the scale of these defenses, London was bombed, although the largest number of *aéroplanes* in any single raid was only thirty-six. Obviously it would be impossible to maintain defenses on the above scale for every city and other nerve centres in a state; but even if it were possible, such defense would be useless against *aërial* attack delivered by thousands or even hundreds of aircraft."

Even though anti-aircraft guns have improved since 1922, and range-finding has materially improved, the new silent engines have been invented which prevent their approach being readily known. It has been calculated that a high-powered engine without a silencer is audible at a distance of seven miles and at a height of 13,000 feet at night time, though these distances are reduced about one-third by day, when normal ground noises as a rule interfere with hearing the engine at such distances. The value of the silencer is then obvious—it puts to naught all the elaborate ground protection against bombing raids, for even the new automatic anti-aircraft guns need first to find the invading plane by its noise, for target and range. Thus again is demonstrated the futility of protecting against the constant application of new inventions for war purposes. No sooner is a protective device found for one form than another makes its appearance. The race is on.

This problem has many aspects. The increased range of the long-distance guns (now well over seventy-five miles) places many of the major cities in Europe within gun range of each other. Imagine, then, this advantage if special concentration of gas is desired through continuous barrage. Imagine the possibilities for destruction, systematic and thorough, which this increasing gun range permits. Mount these long-range guns on enormous motor lorries or railway cars, and the possibilities for destruction include cities farther afield. The concentration of fire and of poison gas in these shells is effective. This is a sinister extension of the tendency to mechanize armies, noted during the war.

As for the improvements in shot and shell, let me not slight the inventions or improved manufacture of this increasingly important line. Likewise the destructive capacity of bombs has been greatly increased since the World War. The weight of bombs intended for military use has come to vary from 100 pounds to 4,000 pounds. The largest will make a crater 65 feet in diameter and 16 feet deep, while the degree to which it endangers the lives of human beings may be measured by the fact that its diameter of possible damage is no less than 2,400 feet. Since the direction of aim has been made more precise, there is great possibility of the destruction of homes lying adjacent to the field of military operations. In each country, this increase in size and destructiveness of bombs, these improvements in bombing technique and in bomb structure, are unceasing. For instance, the modern torpedoes, from 1,000 pounds upward, carry their own motors and their own propellers, automatically set in motion upon release, and automatically controlled and directed when released. This is almost a conscious engine of destruction!

Mechanization of Armies

Liddell Hart, in his book, "The British Way in Warfare," says that this race between new inventions and new protective devices leads to his most desired ideal—the mechanization of our armies. As he sees the trend, we have been developing first motorization of armies, then mechanization.

This trend emphasizes the great importance of adequate gasoline supplies for this mechanized army. During the war Lord Curzon said, "The Allies were carried to victory on quantities of gasoline." Since the war General Devignes has written, "Without national control of gasoline there cannot exist national independence." Therefore the lead-

ing nations, heavily armed, are seeking to control their own sources of gasoline. Such mechanization, dependent on adequate supplies of gasoline, brings complications without end in its train. Colonial possessions, mandates, which are oil-producing territory are highly prized and held. Is this competition of lasting benefit or a source of lasting harm?

Where, with mechanized armies, will the non-combatant be? Under the wheels of the motorized and mechanized army. Quoting further from Liddell Hart:

"Mechanization is the only solution. For to infantry armies, a stretch of country sprayed with mustard gas will be as complete a barrier as barbed wire has been to the infantry unit. Only in tanks and similarly protected vehicles will men be able to manœuvre freely in a theatre of war where gas is employed."

Industrialized Nations Zoned for War

One other aspect of this evident tendency toward the mechanization of armies, noted in its infancy during the World War and since then relentlessly developed, should be intensely explored. Mechanization demands organization of industry to be effective. This organization of industry in each major nation takes two sinister forms. First, the highly industrialized state is zoned according to its geographical areas and manufacturing centers. At the head of each such zone is a military officer, generally a colonel, who is responsible to his chief at the national capital for all information within his zone as to: (1) the number and kind of factories; (2) their production capacity under peace-time schedules and their expansion capacity under possible war demands; (3) their availability for war uses; (4) a detailed estimate of the man power for industrial and military purposes; (5) a definite plan for immediate convertibility into war factories, in case the emergency arises, of all necessary peace-time factories. Furthermore, there is an actual testing during peace time of these arrangements, as far as is practical, at a

certain given time, designated by the chief in the national capital. There are army days in certain countries when such testing is actually tried out on a small scale, without alarming the civil population. Minor wars in South America, for instance, are used to develop armaments technique by manufacturers in other countries and to test out new kinds of guns and shell. A high official in the war department of a powerful country actually said to me that he welcomed this opportunity to ship certain munitions to a warring country because he used it for "educational orders" in munitions. Using small national wars as a testing ground for possible larger ones to come proves not only the constant and increasing preparation for larger wars, but the scorn with which the smaller wars are regarded from the point of view of the value of human life.

It is difficult to give in this short space any adequate conception of the efficiency with which this industrial organization has been carried out in every large industrial nation. The most that can be done is to repeat another high official's words to me when I questioned him on this subject. Sitting in his office, in a great capital, he said,

"I can pick up this telephone, call a certain code number which connects directly and immediately with the largest steel factory in our country, give the man who answers the 'phone at the end a certain code number, and the whole industrial plant is converted within six hours into a munitions plant making specified war articles. That code number controls the whole manufacture of guns, shot and shell casings, tanks, machine guns, etc., etc. I can do the same to each of the key industries necessary for war production. Then I 'phone each of my district colonel-supervisors, give them exact instructions, and the man-power of the nation will be mobilized. It is all systematized down to the last woman. An hour's quiet telephoning and the huge war machine has been started."

This organization holds true for all industrial nations, large and small. How delicious and important it is for the minister

of war of a small nation to call up its only chemical factory and say, "Today, for trial, we are on a war basis. Are you ready? Prepare poison gas number 4610 and let her go!" Due to geographical differences, differences in local details, each nation has its own well-organized program, but each nation is prepared today, if the need should arise, to mobilize its industry for war. This organization has arisen since the World War in order to meet the necessity of mobilizing every last inch of a nation's strength and resources for the convulsive upheaval which modern war demands. The after-effects of the first mild attempt at such organization which the World War demanded are still being felt in ever-cumulative strength in economic collapse the world 'round. But that was just a very mild, tentative economic control compared to what is planned now. What will be the after-effects the next time?

What is the answer to this menace?

If twentieth century warfare demands the regimentation of every aspect of an individual's life, including the willingness to surrender life itself, then either warfare has to be wiped off the earth or else the individual has to be wiped off. The middle ground is the transition period through which we are now passing, presenting a choice between successful disarmament or national annihilation.

Unceasing Development of Industrialized Nations

How far, actually, is this industrialization of nations, in which industrial mobilization is predicated, proceeding? The danger to civilian populations, not only from the economic upheaval involved in warfare, but also from the extended system of zoning which includes as legitimate military targets all factories engaged in the manufacture of war materials (in war time almost every factory, down to soap

factories, can be included in this broad category), can be measured.⁴

"With the development of automatic and semi-automatic machinery, it is certain that the range of industrial production will rapidly spread even in countries with no previous industrial experience. There are few countries which could not now manufacture their own requirements in textiles, cement, soap and many other articles of common consumption. With the growth of economic nationalism, it is becoming a matter of pride in most countries to produce homemade goods, whether they can be produced on a strictly economic footing or not. Moreover, a further impulse has been given to this tendency by the depression, which has forced so many governments drastically to curtail imports from abroad in order to preserve their balance of payments."

There is the evidence on which is based the general principle that the industrialization of nations is an uncontrollable force of immediate importance and value to the problem of war as well as to the maintenance of peace. This expanding force of industrialization has resulted obviously from the war impetus and the post-war years of expansion and, therefore, is a new element in the program of the mobilization of a nation for war. To the militarists it is, to a degree, an

⁴Quoting from the Report of the Director of the International Labor Office, Geneva, 1933:

"This geographical extension of industrial activity is strikingly illustrated by the following figures worked out by the Institut für Konjunktur-forschung to show the annual rate of industrial expansion in different parts of the world between 1913 and 1929." [Thus covering the years of the war.]

"ZONE I. Industrial Europe (Austria, Belgium, Czechoslovakia, Denmark, France, Germany, Great Britain, Luxembourg, Norway, The Netherlands, Saar Valley, Sweden, Switzerland)	Per Cent +1
"ZONE II. Agricultural Europe (Bulgaria, Estonia, Finland, Greece, Hungary, Italy, Latvia, Poland, Portugal, Rumania, Spain, Yugoslavia)	Per Cent +2.2
"ZONE III. High Capitalised Extra-European (United States, Japan)	Per Cent +3.5
"ZONE IV. Moderately or newly capitalised Extra-European (Argentina, Brazil, Canada, Chile, India, Mexico, New Zealand, Peru, South Africa)	Per Cent +3.6
"Zone V. U.S.S.R. [to 1931]	Per Cent +6.3"

unknown power of great potential value. Some openly scoff at its possibilities. Some declare that the \$400,000 spent yearly by one great nation for the maintenance of the skeleton industrial zoning scheme is not half enough. However, when I see such outmoded and unnecessary forms of military expenditure in energy and money as cavalry gently vaulting hurdles placed on the greensward or soldiers, by the thousands, marching in full dress uniforms, I realize that public military tactics of today still hark back in large measure to the time of the war of 1870.

Even if the next war starts where the last left off—and this is a military axiom (which is as outmoded as most military axioms)—it will have to take advantage as quickly as possible of these numerous new inventions.

Warfare of Germs or Bacteria

Before closing this increasingly jolly chapter, a few words must be added about another new form of warfare, developing in possibilities since the last war. Bacteriological warfare, the freeing of certain germs on the enemy, is a field rich in possibilities. Quoting Major Leon Fox, "The spirit of adventure and discovery has always marched with the warrior." Well, warriors bold, what adventure and discovery have you found in the release of germs in your fight for "food and females"? Major Fox assures us, "The race improved because the thinker and successful warrior lived and won the females and left descendants; the slow and reactionary type did not live to reproduce. With every advance in weapons man is giving evidence of a desire to overcome brute strength by means of a weapon with range and effectiveness." If germs can do the trick, then brute strength is overcome by man's superior thinking.

There are, of course, technical obstacles to be overcome in the efficient dissemination of bacteria. Those germs which

are capable of withstanding heat and of remaining unharmed by the explosion of the shell container must be developed. Nevertheless, one way has been thought of to get around this handicap: by enclosing the germs (typhoid germs, for instance) in a glass container which can be dropped and will break on the people beneath, with the hoped-for dire results. Of course, the inoculation of millions of people against some of these germs might be achieved if only one knew the exact germs the enemy was planning to use. The element of surprise is here just as important as with poison gas.

Dissemination of the germs of glands to infect cattle has been successfully accomplished during the war; the poisoning of wells by spies has been achieved; the dropping of arsenic bombs in the reservoirs for our city water supplies is feasible, dependent on the direct hit of the bombs; the chlorine process of water purification makes any contamination by such organisms as typhoid and cholera inoperative, which organisms can be spread, however, by diseased rats let loose in the enemy territory or on enemy ships reaching home ports. Tetanus, gas gangrene, and anthrax are the most dangerous because of their peculiar characteristics for easy dissemination and quick spread. The toxin of the bacillus botulinus is a powerful poison for man, as strong as or stronger than those of the far-famed Cæsar Borgia. Quoting Major Fox:

"An airplane could carry enough of the botulinus toxin to destroy every living thing in the world if administration of the toxin were as simple a process as production and transportation."

The problem of administration is being studied.

The "Big Six" of war-time diseases in the past that have caused more havoc in armies than battle casualties are: (1) the enteric fevers—typhoids, bubonic plague, black death, and paratyphoids; (2) the dysenteries; (3) cholera; (4) typhus;

(5) the plague; (6) smallpox. These are still in existence today, but the progress of medicine, preventive as well as curative, has been able to control to a greater degree than was formerly thought possible the spread of these diseases. Those of us who remember the wildfire spread of black influenza in 1918 and 1919 realize that the menace of wartime disease germs is still very terrible.

The biologic agents available for warfare by artificial mass production are: (1) the communicable diseases; (2) other infective processes (such as wound infections—tetanus, anthrax, gangrene); (3) toxic products of bacteria (botulinus toxin, etc.). It has been agreed that the communicable diseases for war uses are to be classified on the basis of their "routes of transmission" as follows: intestinal diseases, respiratory diseases, direct control diseases, insect-transmitted diseases.

That the nations are aware of this menace is proved by the following quotations from the report of the Special Committee on Chemical, Incendiary, and Bacterial Weapons of December 13, 1932, to the Bureau of the Conference for the Limitation and Reduction of Armaments:

"It is not possible in practice to prevent preparation for bacteriological warfare."

(Under Head I, Part IV, Prohibition of Preparation for Bacterial Warfare, p. 14.)

"How Can Preparation for Bacteriological Warfare Be Prevented?"

"In practice, it is not possible to prevent preparations for bacteriological warfare. The Committee considers that this reply calls for the following explanations:

"1. The problem of bacteriological warfare is entirely different from that of chemical warfare. Chemical warfare is known from actual experience; bacteriological warfare, on

the other hand, is a hypothesis. Nor are there any results of laboratory experiments on which knowledge can be based. The behaviour of pathogenic microbes intentionally transported from the laboratory to natural media is practically unknown to us. It must nevertheless be admitted that such warfare is possible. Furthermore, we can only imagine what it would represent and how it could be prepared, and deduce from such suppositions possible methods of defence.

"2. Bacteriological warfare might be combated with the greatest prospects of success in a country with a high standard of public health. The organization of a suitable health service in time of peace represents the most effective means of defence against bacteriological infection. It is, however, impossible to guarantee that a health service, however perfectly organized, could unfailingly master all the epidemics which might be disseminated.

"We wish to draw special attention to the fact that, after causing an epidemic, a country would speedily lose control of it, and itself run serious risks.

"3. We are not at present in a position to subject bacteriological research to effective supervision. Virulent bacteria, such as might cause epidemics, are to be found in all bacteriological laboratories (both public and private), and also in hospitals treating contagious diseases. There can be no question of hindering the progress of medical bacteriology, the objects of which are humanitarian (the preparation of sera, vaccines, etc.), by supervising and restricting experiments with virulent cultures. Such supervision, moreover, would never be complete, and therefore always ineffective.

"4. The Permanent Disarmament Commission should not lose sight of the possible danger of bacteriological warfare."

(Under Head II, Part II, Establishment of the Fact of the Use of Bacterial Weapons, Chapter I, General Conclusions, p. 19.)

"In case of resort by a State to the use of bacteriological weapons, the establishment of the fact of infringement should fulfill the same conditions of speed, impartiality and competence as the establishment of recourse to chemical or incendiary weapons.

"It may simply be observed that here the necessary establishment of the fact of infection is particularly urgent, not only in order that effective measures may be taken against epidemic contamination, but particularly in order to discover any evidence establishing the *deliberate* character of the contamination and to determine the persons who have taken part in the prohibited acts on behalf of a State at war.

"The difficulties of this investigation are, moreover, greatly aggravated by the fact that the effect of a bacteriological contamination does not make itself felt until the end of the period of incubation and that a deliberate attempt at contamination is not necessarily successful."

(Under General Conclusions of the Report of the Special Committee, *A Prohibition of Chemical, Incendiary, and Bacterial Warfare*, Section II Offensive Material (b) Bacterial Warfare, p. 23.)

Summary and Conclusion

Since the World War closed in November, 1918, there has been an increasing emphasis on research and development of newer forms of destruction which will be more effective for mass destruction behind the lines. This tendency—to include in battle plans the necessary destruction of the civilian aides to war—has been accelerated by the constant development in radius and engine performance of the airplane. This tendency inevitably leads to the logical conclusion that the industrialized nation is the best prepared for war because convertibility of peace-time industries into

war-producing industries has been consistently developed with the development of the mobilized nation. Hence, nations are speeding their industrial development hoping that when war comes, they will be each independent of the other for war materials. This is a vain hope, impossible of achievement to any effective extent. This plan calls for a nation zoned for war, zoned for war preparation and zoned for war defense. It also calls for the unceasing emphasis on new, surprise methods for delivering casualties so that the mass population, necessary for the progress of highly industrialized nations, can be quickly and effectively prevented from war work. Hence, the increasing emphasis on the development of chemical warfare, bacterial warfare, etc., mechanization of armies, industrialization of nations.

The conclusion stands unchallenged—in every field of human activity which can be correlated to war uses, ingenuity and inventiveness, spurred on by the psychology of fear and war, develop new methods of mass destruction. As long as the need for such ingenuity is emphasized, the results of competitive inventiveness for the increase in destructive powers of an armed nation will be forthcoming. Science is daily discovering new things some of which can be applied to the destruction of mankind. This impasse—between industrial nations convulsing every effort for their mutual destruction—can be broken only by good will between nations and the realization that national security is not guaranteed by such methods.

CHAPTER IV

WHAT ATTEMPTS (ALL UNSUCCESSFUL) HAVE BEEN MADE TO SAFEGUARD THE CIVILIANS (NON-COMBATANTS)?

ANOTHER maxim ready for closer inspection and careful questioning is: For every new deadly invention there is a new protection. Surely after these years of developing effective poison gases, there must have been years of ingenuity spent on devising means of protecting the military and the non-combatant. Of course there has been a constant stream of suggestions and inventions, in an effort to cope with the challenging situation.

Protection for the non-combatant against chemical warfare consists today of gas masks, International Red Cross recommendations, and international agreements.

Gas Masks

The gas mask of today is constructed to withstand the known gases, used during the World War. The American mask, 1919 model, consists of a rubberized piece of stockinet with eyepieces set in. Thereto is attached a long rubber tube which leads to the canister, carried on the back. In the canister are to be found a mixture of soda lime and charcoal granules, and a layer of fine felt. These absorbents and the fine wire mesh screening were found adequate, if properly worn and proper discipline were observed, to counteract the poison gas and lethal smoke of the World War. (This mask

did not protect against mustard burns.) They were selected because of their absorptive activity, versatility, chemical stability, low breathing resistance, ease of manufacture, and availability of materials.

Such masks, to be effective, must be without the least rip or tear, to prevent leakage; must be sterilized for each new wearer; must be renewed after each lethal gas attack. They cannot be worn longer than eight hours without definite and deleterious physiological effects on the wearer, whether combatant or non-combatant, all of which effects have been tested and are known.

As a strong concentration of the lethal mustard gas in warm, dry weather is dangerously active for days and even weeks, the impossibility of everyone's wearing a gas mask uninterruptedly for that length of time, and of wearing also oiled clothing and gloves, is obvious. Oiled clothing and skins oiled with a vaseline salve to protect against mustard gas burns are not a probable achievement for the population as a whole. Specially prepared military uniforms, whose material has been dipped in a secret solution, "Impregnite I," are reserved for our military as protection against mustard gas and other gases. This process of dipping clothing to protect against gases is secret, varying in formula and in process with each chemical-producing country. Its manufacturing restrictions automatically hold it to the enlisted personnel. Our civilian clothing is comparatively unimportant and, due to constant changing, obviously not adaptable to ever-ready impregnation against gases.

Then, too, as a result of the war experience, it was found necessary to rebuild and readjust the mask for each new gas used. Starting with sensory irritant gas and a chemically impregnated gauze meshing for the nose, and ending with a complicated mask to meet the constant lethal gas attacks, the mask was and is in a state of evolution. All concerned

are uncertain as to the next move on the part of a possible enemy and hence of the needed protection.¹

The dependability of the gas mask during a poison gas attack is proportionate to the reaction of the individual wearer and the air-tight condition of the mask. Given well trained troops, carefully versed in gas attack procedure, with gas masks in perfect condition, then there is good protection against known gases, whether lethal or sensory irritant, from the present gas masks. If, however, the troops or the public become panicky under constant gas attacks, and the masks through constant use are torn or their chemical qualities exhausted, then there is no help in the gas mask. No one knows the exact life of a gas mask: that is, no one knows how long the chemicals in the canister will be effectively active and absorptive. Some military experts say the American gas mask is good for fifty hours' continuous use, others disagree with this estimate, making the total much less. This uncertainty leads to disagreement as to the value of gas masks with charcoal and cement granules in the canister against persistent gases.

There is one phase of the gas mask which needs further elucidation. The physiological effect of the long-continued use of the mask has been studied, because the introduction of mustard gas, which is persistent for days and even for weeks, demanded expert knowledge of the reaction of the mask on the wearer. If the gas mask must be continuously worn for long periods at a stretch, it was found that the efficiency of the soldier was reduced at least twenty-five per cent.²

¹ General Amos A. Fries, first American Chief of the Chemical Warfare Service, said:

"Thus the development of the mask must be kept parallel with the development of gases and methods of discharging them. Otherwise a new gas invented may penetrate existing masks, and preparations be carried far towards using it before the development of masks is undertaken to care for the new gas."

² Quoting from Fries:

"Physical vigor is one of the greatest assets in any army. Gas, used properly and in quantities that will be easily attainable in future wars, will make the

Apply this to a masked civilian population, and the result is obvious. This can be easily understood when the difficulty of breathing under the stress of hard manual labor is recalled, even with the best of normal conditions. However, when the same arduous labor must be performed with a gas mask on, the difficulty of continued labor and artificial breathing makes the resulting work one-fourth less efficient. Ask an artilleryman how he enjoyed placing a gun in position after a long haul with a gas mask on. The resistance to breathing which even the best gas mask occasions has physiological effects that are serious when extended over long periods.

Then, too, the necessity of sleeping with the mask on, due to the possibility of surprise attacks at night, was realized, as the intensity of gas warfare increased and lethal gases were freely used. The difficulty of trying to sleep while breathing through a gas mask can be appreciated only after one has tried it, and the technique of getting uncontaminated food and water is trying in the extreme. Today, night aërial bombing is constantly practiced and always recommended, for the low-flying bomber is no easy target in the darkness of night. Indeed, the mental and physical effect of the gas mask on the wearer is proportionately unfavorable with the length of time it must be kept on. In summer it is almost unbearable. Some of the soldiers, in desperation, did finally rip off the mask, and said that death was preferable to such living torture. American troops, carefully trained in gas discipline, ripped off their masks in their first evening gas attack, on the night of February 25, 1918, near Seicheprey, too terrified to obey orders. Civilians, with no discipline or orders, but

wearing of masks a continuous affair for all troops within two to five miles of the front line, or in certain places for many miles beyond. If it never killed a man, the reduction in physical vigor and, therefore, in efficiency of an army forced at all times to wear masks, would amount to at least twenty-five percent, equivalent to disabling a quarter of a million men out of an army of a million."

equally terrified, are subject to a similar reaction with its terrible consequences.

Even with the superior training and discipline in the Army, gas casualties occurred as a result of the wrong use of the gas mask. Here is a list of causes of gas casualties in the Army.

"Chief among the causes of gas casualties in the American Army may be mentioned the following:

- a. Gas attacks successfully launched as a surprise.
- b. Lack of gas discipline.
- c. Delay in adjusting mask.
- d. Premature removal of the mask.
- e. Direct hits to mask, rendering it faulty.
- f. Remaining in a gassed area.
- g. Advancing through or occupation of a contaminated area.
- h. Unprotected quarters.
- i. Wearing contaminated clothing after attacks; inability to wash the surface of the body.
- j. Lack of protection of food and water in gas zone.
- k. Handling of contaminated clothing.
- l. Occupying contaminated dugouts; using infected blankets.
- m. Seeking protection in dugouts not gas-proof.
- n. Resting on contaminated soil, or in contaminated woods.
- o. Delay in giving warning to those sleeping.
- p. Long stay in vapor exposure of low concentration."³

Each of these main causes for gas casualties as applied to the Army is equally applicable to the civilian. If one will reread this list and check on probable civilian reactions, one can readily foresee the tremendous amount of civilian casualties if poison gas should be used where it might reach them, and hence the reason for civilian interest in the control of modern war.

Surveying the protection which the combatant and non-combatant expect to receive from the gas mask in the chemical warfare of the future, several facts bear recapitulation.

³ From Army Extension Courses, Special Text No. 57, *Medical Aspects of Chemical Warfare*, 1931, p. 28, Section V, par. 22.

The present gas mask is designed to meet the gases known at present. It is apt to be useless when a new gas is liberated; and chemistry is always preparing new gases and new combinations of gases. As new poison gases are discovered they are held as state secrets. The present gas mask is thoroughly uncomfortable and requires careful training before it can be used with proper benefit. When worn for a long period of time (over eight hours for mustard gas attacks) the gas mask has an adverse effect upon the wearer, mentally and physically. Persistent lethal and irritant gases remain a menace for days and weeks. Hence the gassing of our armies and of our civilians is assured. One might suppose that gas masks may some day be made impervious to all gases. Such inventive genius is possible. Still it is and always will be impossible to train and furnish all civilians with such masks: that fact must be faced.

It takes from three to five months from the time of the first order to produce gas masks in quantity. During that interval much may happen to civilians. No nation today has more than 250,000 masks on hand, because they deteriorate so quickly. Gas masks must be kept in perfect condition and must fit the individual head closely. Gas masks are ineffective after a prolonged attack of a concentrated lethal gas because the chemicals need renewing. Constant issue and reissue of gas masks is imperative if they are to act as a real protection. Under these conditions it is physically impossible to distribute gas masks to millions of non-combatants in time to protect them against sudden, unknown gas attacks.

From these characteristics of the gas mask, three deductions are incontrovertible. First, as research in new poison gases and in new mixtures of known gases is going on uninterruptedly, it is more than doubtful whether the present mask is adequate to meet such a probable menace. Second,

the military have a stronger chance of survival because of their training and discipline; and, third, logically, the non-combatant, if he is to try to save himself, should have mask-wearing instruction in schools and in all places of gathering, and periodic drills in the use of the mask under test bombardments. This is being attempted on a limited and unsuccessful scale in some European countries. To issue masks by the millions to uninstructed people when the emergency is upon them is an impossible task. To buy masks in the department stores, as some terrified Europeans are now doing, is useless and uneconomical, for within a few months they deteriorate and are useless.

It is clear that the non-combatant must be left to his fate when the real gas and high explosive bombardment starts. For to issue and reissue masks to the whole population, to instruct high and low, young and old in their use, to make modern civilization depend on the fear psychosis and the gas masks, is not only an indictment of that civilization, but also a *reductio ad absurdum* of the whole war system. That is what we see today in the futile gas mask drills in Russia, France, Italy, Germany, Japan, Great Britain, and other countries.

The effect of the fear psychosis concerning aërial warfare, especially when combined with gas attacks, in European nations, is shown by a clipping from a New York newspaper dated May 22, 1933:

"HELSINGFORS—The Civic Guard of this city held a demonstration of anti-aircraft devices as part of Finland's program to awaken interest in voluntary air defense, particularly against gas attacks.

"Reports that Soviet chemists have developed the technique of gas warfare to the highest degree of effectiveness yet known, coupled with the manœuvres of 350 Soviet planes in the May Day exercises at Moscow, have resulted in a nation-wide program of instruction in the use of gas masks and other protective devices.

"Propaganda is being carried on through newspapers, by the

distribution of leaflets and in movie theatres by the National Voluntary Gas Defense League, whose immediate goal is 100,000 members. Funds are being sought to extend the campaign.

"It is planned to construct bomb-proof shelters against air attacks in the larger centres. Some hospitals already have such shelters."

Cui bono? This fear psychosis must be allayed through national and international good will and coöperation,—not by military competition.

International Red Cross Recommendations

Are there other forms of protection for the non-combatant? The International Committee of the Red Cross, after years of study by leading European experts, who delved into the feasibility of subterranean passages for city populations, filtered air ventilation systems for such trapped humans, sterilized water and food for inhabitants thus herded, specially constructed entrances to keep out the gas, and other measures, came finally to the conclusion that there is no hope for the non-combatant but to keep the peace; to submit to pacific settlement the disputes arising between nations.

It is illuminating, however, to read some of the recommendations to the Disarmament Conference made by the International Committee of the Red Cross for civilian protection against gas warfare, for the purpose of showing how futile any protection against gas warfare for the millions in our cities is.

"Establishment of a local plan of precautions to take in case of alarm or in view of an imminent gas attack."

"The Commission recommends that the Red Cross suggest to the competent authorities the establishment of a plan of measures to take in case of attack. This plan should comprise a detailed study of:

a. The protection of centers or canalization of every kind: water, gas, electricity, sewers, etc.;

b. The designation of places which can serve as shelters and their transformation; the construction of special shelters;

- c. The re-allotment and the protection of stocks of food, of important materials, the protection of drinkable water;
- d. The designation of places which can serve as stations of aid for gassed men, and their transformation into such stations;
- e. The designation of places suitable for ambulances, hospitals, and their transformation into ambulances for gassed men;
- f. The formation of teams of disinfection and evacuation;
- g. Assembling of stock of disinfecting materials;
- h. The means of carrying the victims to the ambulances and particularly the indication of possible sheltered ways to the ambulances;
- i. The signals of alarm, the police orders, the orders to be given to firemen;
- j. The orders to the population should be prepared and made known to them by all possible means, as quickly as possible.”⁴

What a thorough regimentation of the entire civil population is here envisaged! Later we read:

“The training of the masses in practical exercises to guard against gas does not appear advisable because of the danger of upsetting their morale.”⁴

The rôle of important civilians in preparing against such attacks is planned as follows:

“The Commission, taking note that the protection of civil populations is, above all, a national question, suggests the creation in every country under the auspices of the national Red Cross, of a mixed commission, composed of representatives of the authorities and of important groups of the population particularly interested in the protection of the population against chemical warfare.”⁴

Among “Measures which are forecast” we read:

“The Red Cross societies will see to it in time of war that laboratories are assigned for the study of toxic materials used by the enemy and of the appropriate means for guarding against them.”

Can this be done in time to save the civilian population?

As for “Places to be considered as shelters,”

⁴ *Under Organization of Collective Protection*, pp. 10, 15, 16.

"In every respect it is more advantageous to fit up numerous subterranean chambers of small capacity than spacious quarters underground able to contain a large number of persons. The maximum shelter should contain not more than ten or twelve persons."⁴

How will this be possible in our crowded cities unless we develop underground catacombs?

Furthermore,

"The Commission thinks that the shelter would not give sufficient protection if one would look for air at a certain height above this shelter. It thinks that it is necessary, in any case, to filter the air to be used underground, nevertheless bringing it down from as great a height as possible."

This would necessitate huge chimneys reaching thirty to fifty feet for pure air. This question of ventilation is considered further:

"When it is possible to fit up, in peace time, special shelters for the protection of certain groups of the population (children, old people, sick people, etc.), hermetical shelters might be built in which the supply of oxygen could be chemically renewed, or the materials for generating oxygen."

Under "Recommendations to be observed in connection with new construction" we find:

"Municipalities should know that wooden pavements are readily impregnated with toxic materials. Mineral pavements, non-porous and without interstices, are disinfected more easily than any other kind."

Some idea of the elaborate training and preparation which is being considered may be gained from the following extracts:

"Formation of disinfecting corps."

"In centers where there are organized corps of firemen, the service of disinfection, or a part of this service, might be entrusted to these units. The disinfecting teams should be instructed, if possible, in peace time. The Red Cross can plan an important part in this instruction."

⁴ *Under Organization of Collective Protection*, pp. 10, 15, 16.

"Storage and treatment of apparatus and clothing for the disinfecting corps."

"It is desirable that stocks of apparatus and clothing to be used in case of disinfection should be made up in peace time. As for masks, stocks of industrial masks could be used as a first supply. These stocks, being perishable, it should be made certain that they are kept in good condition particularly by the established aid stations and with sufficient personnel for their distribution."

"Stocks of antidotes for gas."

"It would be advisable to insist upon the necessity of establishing, particularly in the hospitals, and in peace time, stocks of antidotes for gas, such as: chloride of calcium, permanganate of potassium."

No nation has sufficient quantities of these materials to adequately protect even small infected areas. The demand would far outrun the supply.

In this report there is a section on "Organization of individual protection," where we find:

"For the active population protection must be as efficacious as possible, and include the most highly perfected apparatus.

"For the inactive part of the population simplified apparatus can be used which, while not guaranteeing complete protection, will in most cases be adequate to conserve life."

and later,

"Filtering apparatus."

"The Commission, after examination of the question, is convinced that the entire population cannot be provided with individual apparatus. In fact, the cost of such protection would entail excessive expense. The problems involved in giving training to the civilian population, due to their age differences, to their differing physical conditions, would be hard to solve."

Returning to the section on "Tactical measures,"

"Public aid stations in the cities might best be installed in spacious quarters in which water could be dispensed, and means of transportation and telephone communication might be available. *Such would be the large automobile garages in the cities.*" (Italics ours.)

Obviously the very elaborateness of this system for protection is its own undoing. No nation can progress under such hampering influences as these anti-gas measures indicate. These suggestions are too costly, and useless in a surprise attack.

International Agreements to Abolish Chemical Warfare Useless

From international agreements there is, at present, no protection for the non-combatant. Article 171 of the Treaty of Versailles prohibits the use, importation, or manufacture of "asphyxiating, poisonous or other gases and all other analogous liquids, materials, or devices." The same prohibition is meted out to Hungary by Article 119 of the Treaty of Trianon, to Austria in the Treaty of St. Germain, Article 135, to Bulgaria in Article 82 of the Treaty of Neuilly and to Turkey in Article 176 of the Treaty of Sevres. There is only one other agreement against the use of poison gas in war in effect today, namely the agreement reached by the delegates of and ratified by the governments of the Central American Republics,—Guatemala, Salvador, Honduras, Nicaragua, and Costa Rica, who are bound by Article V of the Convention on Limitation of Armaments of February, 1923, not to use chemical arms in warfare. Article V of the Washington Treaty of 1922, prohibiting the use of poison gases, has not been ratified by all of the five signatories and hence is inoperative. The reservations attached by those nations which did ratify have nullified the prohibitory effect of the protocol.

The special committee on chemical and bacteriological weapons of the present Conference on the Limitation and Reduction of Armaments has recommended the abolition of chemical warfare. (See Appendix II.) Whether that provision will be adopted in the final convention and rati-

fied by the requisite number of signatories remains to be seen. What protection is there actually for the non-combatant even if such an international convention should be adopted? The desperate position of a chemical-producing nation pressed for its very existence by encircling foes is tragic indeed, but especially tragic because, as recent history has shown, its psychology at such a time is such that international commitments will be completely disregarded. Prohibition of the use of chemical warfare in peace time is a humanitarian stand, to be applauded as far as it goes, as indicating a mobilization of opinion against a terrible menace. However, that such a prohibition would stop this menace in war time when, as we have seen, international commitments, and national and individual standards are ignored in the desire to impose a military victory, is a vain hope, in which there is no protection for the non-combatant.

Conclusions—Summary

For the non-combatant in the battle area there is and can be no protection against a lethal poison gas attack, suddenly launched. The hope has been expressed that, by some stretch of chemical ingenuity, gases may be evolved which will neutralize the lethal or sensory irritant effect of released poison gases. In time there may be developed a neutralizing gas for chlorine. For mustard gas, however, so far chemists have not been able to find a neutralizer, and, because of its complicated chemical structure $(\text{ClCH}_2\text{CH}_2)_2$, it will be more than difficult to find such a neutralizer.

On this point it is necessary to emphasize again the military advantage of the element of surprise in gas warfare. Suppose a neutralizing gas has been discovered which can nullify the power of a certain gas. What about possible new gases and combinations of gases against which no neutralizing gas has as yet been found? How soon can the gas released

by the enemy attacking force be analyzed, and the neutralizing gas (provided one can be found) produced on a quantity basis sufficient to save the peoples attacked? Gas and counter-gas, in theory, are excellent; in the laboratory, sometimes workable; on the field of action, impractical. There is no hope from the quick action of neutralizing gas.

The following is an excerpt from a joint declaration of scientists, including delegates from France, Germany, Great Britain, Russia, Switzerland, and The Netherlands:

"Experience has shown that all international conventions attempting to limit the applications of science to war are inoperative because they introduce arbitrary distinctions, because they do not go to the source of the trouble and that nothing so deceives a people as to believe in the use of all resources for legitimate defense.

"The only effective action must be the suppressing of war, the denunciation of the sophorism which insists that security rests on armaments and the active propaganda for the definite conclusion that the prompt realization of international justice is a question of life or death for humanity today."

Attempts by the nations to meet this threat of new death-dealing inventions for their populations by the encouragement of new protective inventions has proven unattainable and hence, ineffective. The main emphasis within the militarized nation is on secrecy of preparations and surprise tactics and surprise methods of dispersal. What opportunity is there for the civilian populations to be protected when the military authorities themselves do not know exactly what type of poison gas will be released nor from what quarter the attack will come? Hence, the development of gas masks is not and cannot be ready for the surprise onslaught. International Red Cross suggestions prove once again that just as an industrialized nation bends every energy for the efficient furtherance of war, so the same industrialized nation, to attempt to protect its civilians, must keep in readiness and bend to its will, every aspect of the modern city for

protective purposes. Each city is then an armed camp and a prepared refuge. Even, then, the elaborate means used for protection cannot protect. International agreements in case of war, not to use these modern methods of warfare, must, for the sake of defense, be broken. Gas masks are inadequate; Red Cross suggestions cannot half meet the crushing demands of the millions of our city dwellers for adequate protection against aërial bombardment.

The conclusion stands. No matter how stringent the restrictions to which the nations will bind themselves in succeeding disarmament conferences (and all restrictions and reductions in armaments are valuable as steps to the superseding of armaments by international organization) there can be no complete control over each unit of the chemical industry and no adequate prohibition of the use of poison gas except peace. This statement of fact challenges the peace structure of today. War preparedness on a large scale is equally challenged for its inordinate expense, its comparative waste, its dangers, and, in the final analysis, its uselessness. Security for peoples does not lie here.

CHAPTER V

WHAT IS CHEMICAL DISARMAMENT?

BEFORE tackling the rather difficult question, "Is chemical disarmament practical?" the ground for discussion must be cleared of two important points directly related to the question. Disarmament implies, in the term itself, reduction of armaments used for war. But the important peculiarity of poison gas warfare is that poison gas cannot be reduced in quantity because it is intimately connected with the chemical industry in peace time, an industry which is indispensable and whose expansion is necessary and hence uncontrollable. The future of the chemical industry, with its resulting benefits to mankind, is sure and bright, and in the hands of our research chemists we are safe,—as long as there is peace.

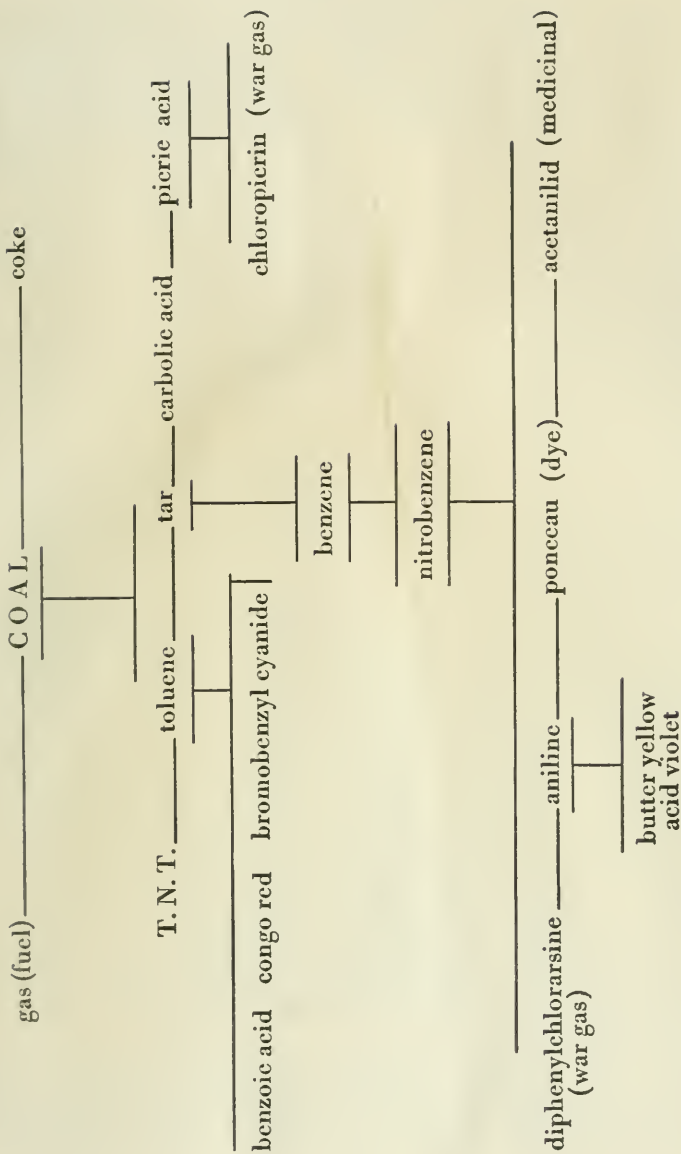
Peace-Time Uses for Poison Gas and Peace-Time Chemical Expansion

What are the peace-time uses of poison gases? In a world in which chemistry holds a predominant place and in which, as the years pass, we shall see undreamed of extensions of chemistry into further fields, the peace-time uses for poison gas are legion. Chlorine, the first gas to be liberated, is indispensable as a disinfectant and water purifier. It is the greatest bleaching agent and has many other important uses in the laboratory and in industry. Other non-persistent gases, such as chloropicrin, cyanogen chloride, and cyanogen bromide, can be used for the destruction of the boll weevil

and other insects. Hydrocyanic acid gas has been found particularly efficacious in the destruction of insects that ruin the orange and lemon groves in California. Phosgene is finding an increasing use in the making of brilliant dyes, and acts with equal efficacy in killing rats. Tear gases, such as chloracetophenone, can be used on mobs, escaping jailbirds, and other trouble-stirring individuals to render them temporarily hors de combat and so, without recourse to gunpowder, easily reduce them to order. It is prophesied that every police station, sheriff's office, jail, and penitentiary will be supplied with non-persistent tear gases. The organic chemicals derived from coal are indispensable to fifty major industries in America. Just to mention a few is enlightening—for instance, varnishes, celluloid, artificial ice plants, fertilizers, tanning industry, paints, lacquers, waterproofing, lubrication, explosives, photography, telegraphy, and medicines.

From coal, dyes, perfumes, and poison gas can be equally easily procured. The following table will explain the close interrelationship generally.

By the electrolytic decomposition of brine (salt solution), which any nation without an established chemical industry can produce, such products as chlorine, caustic soda, soaps, chloride of lime, chloroform, phosgene, chloracetic acid, chloracetophenone, wool green, yellow, cyanogen chloride, crystal violet, etc., are derived. When the air is liquefied, it is readily separated into two main constituents, oxygen and nitrogen. Oxygen is used for medicinal purposes, as an important factor in oxyacetylene welding, and, in the synthesis of phosgene, as a war gas. From nitrogen, the fertilizer calcium cyanamide is derived, which in turn yields ammonia. Ammonia produces ammonium nitrate, nitric acid, and, in turn, nitrous oxide (an anæsthetic), nitroglycerine, chloropicrin (war gas), and cellulose nitrate (smokeless



powder). These are products of industrial nations. That great thinker, Mr. J. B. Dumas, has truly said, "The degree of industrialization of a people is measured by the quantity of sulphuric acid which it consumes." Sulphuric acid is needed in peace and in war,—hence industrialization is greatly to be desired.

If the very air we breath can be transformed into war-time as well as into peace-time products, what hope is there for chemical limitation or chemical disarmament? In the all too brief résumé of the truly enormous field of chemistry and its relation to the equally complicated field of chemical warfare, one all-important fact stands clearly forth: the very fundamentals of our civilization—coal, salt, air—can, with well-known chemical reactions, produce poison gases. All discussion of the future of chemical warfare must be predicated upon that fact. What, then, is the future of chemical warfare?

Basing our conclusions on the foregoing facts and revelations as regards the present development of chemical warfare and its future possibilities, it can truthfully and without contradiction be said that if another war between two big chemical-producing nations occurs at any time from now on, warfare on land will use every form of death-dealing or paralyzing chemical agent against enemy forces, combatant and non-combatant, irrespective of age, sex, or location, to the ultimate end of achieving as wide a destruction as possible in the shortest possible time. Warfare on sea will witness the same aim, involving the destruction of the personnel on shipboard by unknown poison gases liberated in every possible way and sucked into the ship by the ventilating system.

It is an intensely interesting fact that militarists who foresee the future, chemists who know their power, and patriotic statesmen who are pacifists in the fine sense of that

term, as represented by Kellogg, Briand, Hughes, Stresemann, Cecil, MacDonald, Hoover, and Roosevelt, have agreed on the truth of these very probable horrors if chemical warfare is persisted in. Such unanimity is, in other lines, unheard of.

The second important point in connection with the chemical industry is its organization for war. Because of the peculiarity of the quick convertibility of certain chemical factories into war poison gas factories, the whole organization necessary to produce the requisite chemicals for chemical warfare is different from that for munitions, shipyards, and steel mills.

Conversion to War Uses

The immediate adaptability of chlorine factories for chlorine gas manufacture has been stressed. Phosgene and bromine are as readily obtained from dye factories, and so the dye industry is being stimulated in many countries. The necessary intermediaries, well-known, are either being commercially developed or stored where practicable for emergency. Mustard (Yperite) is readily produced by adding HCL (hydrochloric acid—which is copiously produced in everyday chlorine processes) to the automobile anti-freeze preparation, freezone. Of course this is not the only method of obtaining mustard gas, for in each government-owned chemical research and manufacturing center in chemical-producing countries there has been established since the war a thoroughly equipped unit for the manufacture of mustard gas, either by the Levinstein process or the Pope process. Chemical intermediates, such as thiodiglycol, can be stored in government headquarters in solid form for years, ready for a war scare, at which time the next chemical step, quickly taken, will easily and quickly transform it into mustard gas, the king of poison gases. The problem of the commercial

development and storage of chemical intermediates has not been touched by international agreements because of its complexity.

Other gases, non-persistent, are as easily obtainable from our chemical industries. Methyl chloroformate, chloropicrin, diphosgene, bromacetone, diphenylchlorarsine, are daily by-products of the ever-expanding chemical industry. Add to the short conversion lag, as the time element is called in the conversion from peace uses to war uses of chemical factories, the fact that nitrate plants for the artificial manufacture of nitrogen from the air are now found in almost every large industrial country, such as Great Britain, France, Germany, Italy, the United States, Russia, and Japan, and one can see how independent of chemical raw materials most industrial countries are. Pass an electric current through a purified, strong salt solution (salt and water) and you produce chlorine gas. From coal, from the air, and from salt, poison gas, as we have seen, can be derived. There is little lack of chemical raw materials for the large industrial nations today.

Gas Containers Always Ready

For gas containers, industry stands ready within a few hours' notice to furnish the necessary items. Liquid mustard gas can be poured into an ordinary keg (a beer keg if no other is available) with a good-sized bung hole which, when inverted in a fast-flying plane with a floor aperture, simply rains on the place beneath the deadly gas. The objection has been raised that this quick handling implies leakage which, in the case of mustard, would be deadly. Well oiled, well clothed, well masked, well gloved, such comparatively few workers could thus be protected. For the millions, such protection is impossible.

The gasoline industry has large motor trucks, special nozzles for the handling of tetraethyl (a deadly gasoline mix-

ture), and large cans ready, if need be, for the transportation of chlorine. What country has no beer kegs or gasoline containers today? They are universal—the accessories of civilization. The tanks used so much in the United States for artificial gas for cooking are ideal for instant use for cylinder gas attacks of chloropicrin and even phosgene. The account of the convertibility of peace-time containers into war gas containers could be continued in greater detail here if necessary, for ingenuity has been applied and plans worked out in detail which may prevent any time-consuming hitch. The integration through industrial preparation of strategically placed chemical factories, rapid methods of transportation—rail, motor, water—and other necessary industrial units, reduces the conversion lag from a peace-time to a war-time basis by many weeks.

I would remind those who still pin their hopes on a decent time interval from peace to war production, made longer, if possible, by a supposed lack of gas containers, that in every chemical-producing country there is stored at the present time sufficient containers, shot, shell, cylinders, bombs, torpedoes, projectors, etc., etc., for the first major offensive (or defensive) so that peace-time industry (if not already destroyed by enemy bombardments) can rush into the production schedule for war, eliminating any hiatus in the flow of poison gas, containers, etc. This problem of shortage, either of gas, of chemical intermediates necessary for the final conversion into poison gas, or of containers of all kinds, —in fact, of military necessities of all kinds, is immensely important and has been met by very serious plans for overcoming such obstacles.

In the case of poison gas and containers, who is there can tell whether this gas is being stored for peaceful or war purposes? The distinction is hard to make, unless peace is assured.

Segregating and Combining Chemical Units for Poison Gas Production on Mass Scale

The fact that the chemical industries most immediately needed for war gases have, as a result of planning, had their major production capacity plants grouped into integrated units, is significant of war gas preparation for the next war. For instance, the principal German Chemical factories, producing chlorine, mustard gas, and phosgene, as well as other gases, are concentrated around Leverkusen and Berlin. In France, similar groupings are found around Paris and Lyons. In Great Britain one finds the same ominous concentration around London. In the United States there are really three such groupings: one in the large chlorine factories in the vicinity of Niagara Falls; the second around Edgewater, Maryland, the site of the Government's gas testing, gas research, and gas production plants, as well as of the large Dupont chemical works and proving grounds; the third around Charleston, South Carolina. Japan is learning fast, for near Yokohama there is developing a center of chemical industrial activity, both private and government-controlled. Italy follows suit at Montecatini and Rome.

These facts are not scare-heads nor are they to be overlooked. This is a logical development for the sake of economy and efficiency as applied to the war system. Concentrate all production, confiscate private control in the emergency of war, and mass production for mass murder will result. However, it is important in this connection to point out that this interrelationship between private and governmental chemical interests is indissoluble and continuous. The tendency, which has become almost a stampede in the various countries, to bring under governmental control the major industries by one means or another intensifies the menace of chemical warfare in case there should be a war (by imme-

diate government control and direction of the chemical industry) as well as enhancing the beneficent effect of the chemical industry for all people in peace time.

Now we can briefly review the main points in this discussion in preparation for the summary of the interesting aspects of chemical disarmament. Immediate convertibility of some parts of peaceful chemical industry into poison gas producing units for war purposes, with quick convertibility of containers from peaceful uses into gas containers, means that chemical-producing countries, strongly industrialized, are always ready for war production on a scale for mass destruction. This is true regardless of international restrictions, which have always contained loop-holes. The interrelation between private and governmental chemical industry, in physical location as well as in mutual understanding, on the plea of self-defense, is growing closer; hence the balance rests between a chemical war and a constructive peace.

Suggestions for Chemical Disarmament and the Answers

But surely there must be a middle path—chemical disarmament. To a certain extent,—yes. To clarify the many suggestions toward that end, we shall list them, with appropriate answers:

(1) Limit raw materials to an industrial importing nation (Great Britain, for instance). This would be impossible for, as we have seen, chlorine gas can be manufactured from national supplies of common salt; from the air, nitrogen fixation plants produce nitrates which can be used for poison gas; from coal poison gas can be derived, so that those countries having a sufficient coal supply are independent of other chemical importations in case of the need of poison gas in quantity. (This method might possibly be effective in the case of a non-industrial, importing nation, such as

Albania, but would put this small nation at a great disadvantage in comparison with its powerful chemical-producing neighbors.)

(2) Chemists should enter into an agreement not to further research in poison gas or to help in the manufacture of gases. This, too, is impossible, for chemists have nothing to say in this matter. As routine work in their research, either in university laboratories or in the laboratories of industry (industries such as those producing rubber products, dyes, silk, leather goods, medicine, electricity, coal and its products, glass, steel, gasoline, automobiles, etc.) chemical research departments are an inseparable part of the organization. Small amounts of a new gas may be discovered, and unusual combinations of known gases are all part of the routine. That such information, after careful retesting, and after facts and figures have been worked out for the manufacture of such gases on a mass production scale, is sent on to the proper authorities of the chemical warfare section of the respective country, is a collusion which cannot be stopped, for the plea of self-defense is all-powerful to the patriotic chemist.

(3) Prohibition of the export of poison gas by neutral states has two objections. First, it penalizes the non-producing nation (such as China) as against the chemically armed aggressor nation (Japan). Secondly, such prohibition encourages the spread of strategic chemical factories, artificially supported by government subsidies, ready for an emergency.

(4) Some have even gone so far as to advise the encouragement of the spread of chemical factories to all nations as a form of chemical disarmament, so that the chances of chemical warfare would be even for all involved in a possible conflict. This is obviously a most devious route toward chemical disarmament, to be discouraged because it is uneconomical and intensifies competition in poison gas secrets.

(5) To renounce the right of retaliation would be impossible unless a nation would prefer to watch itself being gassed, or unless security through strict sanctions is evolved.

(6) Reprisals by poison gas would necessitate continued preparation for it, competition in research, and is complicated because it is difficult to decide who used gas first in an attack, or whether it had been used at all; for in some cases the delayed action of the gas (mustard gas, for instance) makes the decision as to who used the gas first impossible of fair decision.

(7) Terrible penalties might be inflicted on a nation which used gas. Certainly if such penalties were invoked, the innocent would suffer under bombardment with the guilty who had ordered its use. Who would be the judge as to what penalties should be inflicted? Who would inflict the penalties? This suggestion of penalties, to be effective, must be made by the combined effort of all nations, and so presupposes a world state which is not yet in existence.

(8) Rationing of the manufacture of chemicals by agreements between chemical industries now in existence, the large national chemical units and the government-controlled chemical plants, for the specific nature of the materials produced and the quantities manufactured, has been suggested. This form of chemical disarmament is quite feasible if all chemical-producing nations would enter such a world combine for the benefit of all, backed up by political guarantees of co-operation. It presupposes a world planning scheme toward which our economic necessities are forcing us to drift. I have spoken to representatives of the chemical industry in Germany, France, and the United States, and each one assured me of his willingness to enter into such a binding agreement, which might have penalties attached in case of violation. In support of such an agreement between chemical-producing nations, the policies of the Permanent Commission

on Disarmament (to be established it is sincerely hoped, as a result of the deliberations of the First World Conference on Limitation and Reduction of Armaments) could be invoked and the personnel of the Commission pledged to its supervision and enforcement. Such a double control,—first, an agreement between the chemical industrialists to curtail and announce production schedules, and, secondly, the supervision of production schedules by the Permanent Commission on Disarmament, would prove a valuable check.

(9) The abolition of government-subsidized chemical laboratories for research in poison gas, whether for defensive or offensive purposes and, if possible, the abolition of the chemical warfare sections from the Army, Navy, and War Departments of all countries having such sections. This is highly commendable, but it is more than wise to keep in mind that if this should be done as a result of a Disarmament Conference, the national chemical sections will be officially disbanded, and then attached instead to each regiment, naval unit, and air squadron. In other words, the instruction and training in the use and release of poison gas will be disseminated to key officers throughout the military personnel instead of, as at present, centering in a picked group who will be ready to be attached to each military unit. This spread of the knowledge of chemical warfare to all branches of the military machine is foreshadowed definitely if the abolition of government chemical warfare sections is agreed on at Geneva. The fact that chemically trained personnel are regarded as so indispensable confirms the thesis of this book that the warfare of the future will be largely fought by means of poison gas.

Uncontrollability of Poison Gas Development

Every effort must be made, obviously, to control or prohibit the use of poison gas, but with all the official agree-

ments on file, duly ratified, two terrible, warning facts must be kept in mind. First, similar agreements have, when the emergency arose, been violated during the World War (such as those adopted at the Hague Convention of 1907); it is possible that new agreements might be violated if the nations again had recourse to war. Second, private chemical industries are continuing and must continue their research work, so that neither the competition in new gases nor their manufacture on a quantity basis can be stopped by international agreements.

General Nollet, the French commander of the Inter-Allied Commission of Control which supervised the disarmament of Germany after the World War, found it impossible for the continuance of German industry and the health of the people to destroy German chemical factories which were imperative for peace uses, but which had been making war gases. He found, for instance, that in the 3,400 chemical factories in Germany in 1920, 1,137 of them were employing more than fifty workers each, and 250 of these had been manufacturing some form of war gas. He could not destroy these factories, for in peace time they made chemicals necessary for industry and health. He could not prevent, as he said, the development of surprise gases. It is impossible to chemically disarm a nation, was his conclusion.

This uncontrollability is the vital point in the importance of chemical warfare. The chemical industry is so interwoven with our daily lives in peace time, and its convertibility into war uses is so rapid, that it is, in the final analysis, the sword of Damocles hanging over our heads, suspended and controlled by the hair-breadth of the strength of the peoples' desire for peace.

In summing up this chapter on chemical disarmament, the immediate objectives—those forms of disarmament obtainable now—will be listed for increased clarity and those objectives

which can be attained only with the passage of time will be indicated.

The immediate objectives in chemical disarmament—all of which must be attained now—for some measure of security, are:

(1) Abolition of the preparation for chemical warfare by the governments concerned. This will, if agreed to, eliminate the government testing and research stations as well as the integration between university and private research laboratories and government stations. This will also, from another angle, lengthen somewhat the conversion time from peace to war production schedules.

(2) Integration of private and state chemical concerns as to production programs into a national unit and its supervision by the Permanent Disarmament Commission.

(3) Elimination of such government-sponsored private organizations as, for instance, "Osoviachim," the Russian chemical aviation society, supported by millions of members and encouraged by government support and the German-Luftschutzbund.

(4) The elimination of the development or storage of chemical intermediates necessary only for war gases. This will again lengthen the conversion lag from peace to war uses of some gases, although it must be kept in mind that such toxic gases as chlorine are ever ready.

(5) This program as such has value only if other forms of disarmament on land, sea, and air are equally achieved; otherwise this would merely be an ineffective gesture toward the futile goal of humanizing war.

Summary and Conclusion

The constant, close connection between peace-time chemical industries and their convertibility into war-time production of poisonous gases can never be checked or controlled

unless there is no provocation to war. Peace-time industries stand ever-ready to furnish not only the necessary chemical gases and poisonous smokes but also the containers to send them to the strategic areas. Chemical factories are grouped in the various nations at strategic points to protect the nation and are prepared to manufacture and disseminate poison gases. The continued development of government control over large industries means that the chemical and aviation industries are closely allied with government military plans and programs of each nation so equipped. Thus, the new deal in economic reconstruction going on in each major nation directly benefits by centralization, the military program of each highly industrialized country. This is a significant fact which should not be overlooked—especially when the methods for government control over shipment of arms and ammunition is being worked out. Is chemical disarmament possible? Is that the middle ground which we are seeking in this careful review of modern methods of warfare? To a slight extent, chemical disarmament is possible but even then, does not assure the safety of the peoples. To the extent that the abolition of government endowed chemical research centers helps chemical disarmament, such abolition should be asked for. But, again and again, the main point in the discussion of chemical war should be stressed—namely, that the quick convertibility of peace-time chemical industry into gas producing units for war is in some cases, a matter of a few hours, in other factories, a matter of a few days. There can never be chemical disarmament under such conditions, especially since private chemical industry is coming more and more under government control. Conclusion—The expansion of the chemical industry is needed for peace uses—hence, the threat from chemical warfare cannot be controlled unless there is no war, no need to use lethal poison gas. Thus, through the quick conversion of chemical

factories and the uncontrollable development of the chemical industry, a major problem is placed before the peoples and the nations—if and when war comes between highly industrialized states, do we want to be gassed as an attempt at a solution or do we know of other ways of settling disputes between nations?

PART II
AVIATION



CHAPTER I

A SHORT, GRAPHIC HISTORY OF AVIATION DURING THE LAST TWENTY-FIVE YEARS

THE history of successful aviation and practical aircraft actually goes back much farther than twenty-five years. Leonardo da Vinci (1452-1519), the famous painter, had theorized in his many sketches over the possibility of flying. In 1783 the Montgolfier brothers in France were the first to conceive the idea of the lifting power of hot air as applied to human transportation, and so their first man-carrying balloon, so supported, rose in October of that year. From that beginning it is very significant to watch the French initiative in the field of aviation. The work of the German, Lilienthal, lay in perfecting gliders; then Wolfert's first gasoline-engined airship in 1896 led directly to the development of Zeppelins. Sir George Cayley, of England, "established the principle of heavier-than-air craft, mechanically driven, fitted with fixed wings, supported by the dynamic action of air." The Wright brothers in the United States made the principle practical. Thus in every land, man's dream of flying was slowly evolving into reality.

This dream, from the beginning, was associated with war. It is interesting to note that the military potentialities of *aéronautics* were seriously considered soon after the earliest balloon experiments. In fact, the balloon, the airship, and the airplane, have each in turn been bent to military as well as to peaceful ends. Military demands have been and still are at work in the development of air transport to a far greater degree than in any other form of transport.

A corps of aviators directed balloons in the French Revolution, beginning with the siege of Maubeuge, in 1794, only eleven years after the first balloon ascent. Slight use was made of balloons at the siege of Antwerp (1815), Algiers (1830), Milan (1848), and Venice (1849). The beginnings of air transport are to be noticed in the remarkable balloon services operated from besieged Paris between September, 1870, and January, 1871. Sixty-six pilots transported 102 passengers 11,000 kilograms, as well as mail and 400 carrier pigeons. Many of the trips were made at night. Balloons were regularly used by the British, French, and Italians in most of their colonial wars from the year 1884 on.

By this time all the principal powers had organized balloon schools within their borders. Before the end of the nineteenth century even most of the smaller European powers had set up balloon schools. The Lebaudy airship, purchased by the French Government in 1905, was the first airship found suitable for military operations. Military aviation, as such, first came into existence in 1909, in France. Airplanes and airships were first used in an armed conflict as early as the Italo-Turkish War of 1911-1912. Aircraft was also employed in the Balkan wars.

It seems, too, that from the start, international congresses interested in aviation were trying vainly to control aviation, whether in the form of balloons or later of planes and airships. Before the war, starting in 1889, there were five sessions of the International Aëronautical Congress (in 1889, 1900, 1906, 1907, and another in 1907); six sessions of the Institut de Droit International (1900, 1902, 1906, 1908, 1910, 1911); two sessions of the International Law Association, in 1912, and 1913, concentrated on holding the menace of the air within special limits (which were disregarded in the war); and the Juridical Congress on Aviation, meeting in Verona in 1910 and subsequent occasions, including the

Congress of the International Legal Commission on Aviation, which met three times,—all were powerless before this uncontrollable development of aircraft. The Hague Conferences of 1899 and 1907 also considered this problem and were unable to cope with it effectively.

So military aviation was on a firm footing in France, Austria, Germany, Italy, and Russia by the year 1912. Military aviation developed in other parts of the world at the same time. Although at first scorned by the American military authorities, the Wright brothers soon proved the value of their planes to European nations, thus setting the pace for American aviation which, in its steady strides forward, has never lost the lead.

In thus outlining the development of military aviation, it is necessary to retrace our steps somewhat to follow the astounding development in inventions and in flying itself during this period from 1898 on.

After 1896 progress in the long history of aircraft was more marked. The temptation to go into detail is great, for the factual story of aviation, man's victory over the air, has elements of the divine in it, from whatever angle one views it. However, only a few milestones can here be mentioned, to set the frame for the more detailed picture of the last twenty-five years. Even as I write, new records are being made, new developments foreseen. Aviation is changing itself and ourselves each passing year.

COUNTING FROM 1933, WHEN THIS WAS WRITTEN.

Thirty-five years ago—1898. Zeppelin organizes a stock company for building airships.

Thirty-four years ago—1899. First Hague Conference rules that aircraft, present or projected, will not be allowed to take part in war.

Thirty-three years ago—1900. The Wright brothers make short glides at Kitty Hawk, North Carolina.

Thirty years ago—1903. The Wright brothers build the first gasoline engine for powering their plane.

Thirty years ago—1903. The Wright brothers make the first undisputed flight, power driven, man-carrying, for twelve seconds, covering 120 feet.

Twenty-seven years ago—1906. Santos-Dumont wins the Arch-deacon prize for flying 164 feet at Bagatelle, France.

Steadily, each year, progress was made in this infant industry. We shall divide the years from 1906 to the present roughly into the following three categories: progress (*a*) before the World War, (*b*) during the World War, and (*c*) since the World War,—showing in this way how aviation and quick convertibility from peace to war uses will be evident as this history progresses, and is all-important in its relation to the relation to the needs of peace and war in the future.

COUNTING FROM 1933.

Twenty-five years ago—1908. Delagrange takes up Mme. Therese Peltier, first woman to go up in an airplane (Turin, Italy)

"L. Z. 4" distinguishes herself by making a twelve-hour flight of 235 miles, including crossing the Alps, average speed thirty-two miles per hour.

Breguet-Richet biplane-helicopter is said to have flown sixty-four feet.

"L. Z. 4" explodes and is completely destroyed in a storm, after traveling 600 miles across country.

Twenty-four years ago—1909. British Parliament appropriates \$400,000 for aëronautics.

Bleriot flies the English Channel from Sangatte, France, to Dover, England, in thirty-seven minutes.

The "Wright Flyer" is accepted by the United States War Department after successful trials.

Nine machines in the air at the same time at Rheims Air Meet (France).

Farman climbs to an altitude of over 300 feet (Rheims).

Willard falls into water in attempt to fly Curtiss plane.

Orville Wright sets a new record by staying up one hour, thirty-five minutes, forty-seven seconds—a new passenger endurance record.

Wilbur Wright flies around the Statue of Liberty.

"Parseval III" makes a successful 500-mile intercity tour (Germany).

Wilbur Wright flies up the Hudson River to Grant's Tomb and back to Governor's Island $19\frac{1}{2}$ miles in $33\frac{1}{2}$ minutes (New York).

Twenty-three years ago—1910. Curtiss flies from Albany to New York, 150 miles in two hours, fifty-one minutes, winning the New York *Herald* prize.

Zeppelin inaugurates the first airship passenger service when the "Deutschland" makes a 300-mile trip from Friedrichshafen to Dusseldorf, Germany.

The dirigible "Clement-Bayard" flies from Lamotte-Brenil, France, to London, England, 242 miles in six hours.

Chanez flies over the Alps, but is fatally injured while attempting to land at Domodossola.

Wellman starts from Atlantic City to cross the Atlantic by the airship "America," but is picked up 400 miles at sea.

Belmont Park International Aviation Meet brings out forty planes.

Twenty-two years ago—1911. Ely lands on the deck of the cruiser U.S.S.S. "Pennsylvania" (San Francisco Bay, California).

Orville Wright makes first real soaring glide in history in nine minutes, forty-five seconds (Kitty Hawk, North Carolina).

First U. S. Air Mail carried from Nassau Aviation Meet to Mineola, Long Island, by Postmaster General Hitchcock and Captain Beck.

Air mail begun in England between Herndon and Windsor.

Cody builds an elaborate machine called the "Cody Cathedral" which wins the Michelin Cross Country prize in 1912.

Twenty-one years ago—1912. English military airplane competition produces eight types of engine.

Twenty years ago—1913. Pegoud makes the first voluntary loop-the-loop and later the vertical figure "S."

Nineteen years ago—1914. Trials of "America," Curtiss flying boat intended for transatlantic flight, in July.

Here the World War begins. Note the progress of aviation during the war.

Nineteen years ago—1914. British Expeditionary Force saved from annihilation during retreat from Mons by aerial reconnaissance.

First Zeppelin raid of the World War (Antwerp).

Lieutenant Immelmann flies over Paris, dropping notice demanding surrender of the city.

English Avro planes fly 250 miles over enemy country to bomb Zeppelin works at Friedrichshafen (Germany).

Eighteen years ago—1915. First Zeppelin raid against England drops bombs on four cities.

Garros fires machine gun through propeller by fitting steel deflecting plates to propeller.

Fokker develops synchronizing gear for firing machine guns through propellers.

First coöperation between bombing planes and army combat operations.

Seventeen years ago—1916. Hydroplane from airplane carrier "Engadine" reports German Fleet before Battle of Jutland.

Sixteen years ago—1917. English Air Corps takes record number of 1,805 photographs in a single day.

Zeppelin L-59 makes a world's distance record of 4,225 miles in an unsuccessful attempt to take hospital supplies to German East Africa.

Fifteen years ago—1918. Royal Flying Corps use twelve types of planes.

Fourteen years ago—1919. "NC-4" makes first trans-Atlantic flight via the Azores.

Hawker and MacKenzie-Grieve come down 1,005 miles east of Newfoundland in an unsuccessful attempt to cross the Atlantic.

Alcock and Brown make the first non-stop trans-Atlantic flight, St. Johns, Newfoundland, to Clifden, Ireland.

British airship "R-34" makes first lighter-than-air transatlantic crossing.

Captain Ross Smith and crew fly 11,000 miles from London to Australia in twenty-seven days and twenty hours.

Twelve years ago—1921. British air "R-38" breaks in two during test trip.

Ten years ago—1923. De la Cierva's autogiro makes first flights.

Kelly and Macready make complete first non-stop, transcontinental flight from New York to San Diego, 2,516 miles in twenty-six hours, fifty minutes.

Smith and Richter show how to refuel in flight.

U. S. Airship Shenandoah accepted after trial trip.

French airship Dixmude (taken over from Germany after the war) lost over the Mediterranean with all on board.

Nine years ago—1924. Four Army Douglas planes take off from Seattle for round-the-world flight which is completed by only two planes, "New Orleans" and "Chicago."

United States transcontinental air mail service begins.

"ZR3" (later "Los Angeles") flies from Friedrichshafen, Germany, to Lakehurst, New Jersey.

Eight years ago—1925. Byrd and MacMillan, in navy amphibian, do Arctic flying.

Cobham and two companions fly London-Cairo-Cape Town, 8,500 miles in ninety-four hours.

Seven years ago—1926. Byrd and Floyd Bennett fly to North Pole.

Amundsen flies over North Pole in semi-rigid "Norge."

Six years ago—1927. Lindbergh's historic flight, west-east over the Atlantic, in thirty-three hours, thirty-nine minutes, winning the Orteig Prize.

Chamberlin and Levine fly the Atlantic to Germany.

Maitland and Hegenberger fly the Pacific, Oakland to Honolulu, 2,400 miles in twenty-five hours, fifty minutes.

Byrd and three others fly Atlantic to France.

Dole race, Oakland to Hawaii, costs ten lives; only two out of eight planes arrive.

Breguet biplane, manned by Coste and Le Brix, flies 2,000 miles, from Senegal, Africa, to Rio de Janeiro, South America, in twenty-one hours, eighteen minutes.

Five years ago—1928. Lady Mary Heath makes solo flight from Cape Town, Africa, to London.

Honorable Elsie Mackay and Walter Hinchcliffe lost at sea in an east-west transatlantic attempt from Croydon, England.

General Nobile flies over the North Pole in the semi-rigid airship "Italia," which is wrecked on the homeward journey.

Kingsford-Smith and three companions fly 7,400 miles in an epic journey from Oakland, California, to Sydney, Australia, via Honolulu and the Fiji Islands.

Stultz, Gordon, and Miss Amelia Earhart fly from Newfoundland to Wales. First woman to fly the Atlantic.

Goebel makes a non-stop flight, Los Angeles to Roosevelt Field, New York, in eighteen hours, fifty-eight minutes.

"Graf Zeppelin" flies from Friedrichshafen, Germany, to Lakehurst, New Jersey, with twenty-three passengers, in one hundred eleven hours, thirty-five minutes.

Four years ago—1929. "Question Mark" goes up from Los Angeles and stays up for 150 hours, forty minutes, fifteen seconds, by means of refueling.

Captain Hawks makes a non-stop flight, Los Angeles, California, to Roosevelt Field, New York, in eighteen hours, twenty-two minutes.

"Yellow Bird" flies from Old Orchard, Maine, to Spain in twenty-nine hours, fifty-two minutes.

"Pathfinder" flies from Old Orchard, Maine, to Santander, Spain, in thirty-one and one-half hours.

"Graf Zeppelin" makes round-the-world flight, Lakehurst to Lakehurst, in nine days, twenty hours, twenty-three minutes.

Non-stop Zeppelin, Friedrichshafen to Tokyo, 6,980 miles in 101 hours, fifty-three minutes.

Manner and Walker make a refueling non-stop transcontinental round trip flight, Spokane to Spokane, Washington, with eleven contacts.

Byrd flies over the South Pole in the monoplane "Floyd Bennett" in fifteen hours, fifty-one minutes.

Three years ago—1930. Colonel and Mrs. Lindbergh, fly from Los Angeles to New York, fourteen hours, forty-five minutes, thirty-two seconds.

British airship "R-100" flies from England to Canada in seventy-eight hours, fifty-one minutes.

Von Grunau and three others fly Atlantic, east-west.

Coste and Bellonte fly from Paris to New York, 4,100 miles in thirty-seven hours and eighteen minutes.

British airship "R-101" explodes and kills all but seven.

Italian squadron of fourteen seaplanes under General Italo Balbo leaves Italy for Natal, Brazil, December 17. Arrives January 6, 1931, after two crashes and five deaths.

Two years ago—1931. Amelia Earhart Putnam, in autogiro, reaches 19,000 feet.

Elinor Smith flies up over New York City 32,500 feet.

U. S. Army Air Corps in full army strength, 650 planes, over Chicago, Washington, New York, Boston; no accident.

Professor Auguste Piccard and Charles Kipfer ascend 52,000 feet in Augsburg, Germany, in a seven-foot aluminum sphere sealed and suspended from a balloon.

Post and Gatty fly around the world in eight days, fifteen hours, and fifty-one minutes, with flying time of four days, ten hours, and eight minutes.

One year ago—in 1932. Amelia Earhart Putnam flies the Atlantic alone in thirteen and one-half hours, landing in Ireland.

TODAY—in 1933. Post flies around the world, in solo flight, in seven days, 49 minutes, over a distance of 15,596 miles.

General Italo Balbo leads flight of twenty-four seaplanes from Rome to Chicago and back, a total of more than 6,000 miles, with loss of only one life.

Annual airplane mileage in air transport more than 81,395,000 miles (estimated).

Lindbergh maps stations via Iceland and South America for Pan-American Airways transatlantic service.

No other form of transportation in all history has shown such rapid development or continues to show such development. As the progress of aviation in the past twenty-five years is outlined, the trends are so well established that we may predict with certainty a marked increase in the development of aviation in the immediate future, and what the far future will have in store for us, none dares prophesy. Arabian Nights tales are mild in comparison with what has happened within twenty-five years in aviation's progress; even H. G. Wells cannot picture the progress of the next twenty-five years.

Summary and Conclusions

There are some significant points in this short, eventful history of aviation which need crystallization for the purpose of seeing the present and the future more clearly. There has been indicated in the above record an increase in speed and radius of engine performance, an increase in plane durability and safety, an increase in the knowledge and utilization of weather conditions, and an increase in the number of expert pilots. There was implied the development of a well-established airplane industry, the gradual elimination of the spectacular for the steady usefulness of aviation. These developments are all-important for its use in peace and war. To take just one factor—speed: the maximum speed of the

airplane in 1914 was 110 miles per hour, whereas today the naval bombing planes dive at 500 miles an hour and on level flying make 250 miles per hour. Civilian planes are approaching the 200-mile-per-hour mark with ease.

Conclusion

On the unceasing mechanical development of the airplane volumes could be written, on the millions of dollars spent and constant thought engaged in research in the powerful industrial countries, all of which have powerful aerial forces. Industry and aviation are firmly wedded now, after the initial trial period. For the mechanical improvement of the airplane and of the dirigible is all-important not only to industry in peace time but also to any nation in war time. The reason for this competitive emphasis on the mechanical development of aviation and its necessary corollary, the expansion of the airplane industry, is obviously its intimate relation to security and war uses. Industry and aviation for war uses are inseparable. Industry and aviation for peace uses are indissoluble. The convertibility of peace-time aviation into war aviation is, as we shall see, guaranteed—when and if war comes.

CHAPTER II

AVIATION TODAY AND TOMORROW

Aviation's Infancy during the World War

WHEN the World War broke out in 1914 aviation was in its infancy, compared with the adolescent period of rapid expansion which we are seeing today. Those of us who were in France in 1913 and saw the July 14 celebration at which the latest airplanes slowly and laboriously flew about the field at Auteuil, the clumsy, dangerous method of landing, and the terrible accident to one of the planes on landing, heard at the time the audible comments of the military as to the impracticability of airplanes in warfare. Those of us who were in Germany on September 2, 1913, and saw the celebration in Berlin of Sedan Day, recall the Zeppelins slowly flying over the heads of the populace as they stared with awe at the Kaiser and his six sons, leading the military procession down Unter den Linden. Those of us at Geneva, in 1933, who watched the Graf Zeppelin lazily and ominously swing over that neutral city, headquarters of the League of Nations, are given to pondering the eternal question, "Is it peace or war?" Today aircraft is all-powerful, another species entirely from the early examples.

The value of the airplane in war was soon recognized, even in those early days, and its development under emergency war conditions was rapid. The balloons, Gothas, Zeppelins, and avions were used to obtain information of enemy movements and, in the case of the last two classes, to photograph enemy positions, to bomb or to photograph enemy artillery, ammunition dumps, dugouts, trenches, general headquarters,

and towns. During the World War, German airship raids on Great Britain totaled sixty-eight, with total killed, 556, and casualties 1,350. Airplane raids on Great Britain numbered seventy-three and killed 767, with 1,650 wounded, a small number for the number of raids, showing the ineffectiveness of the small bomb and the plane of those days in comparison with anti-aircraft devices quickly set up. The history of the development of British anti-aircraft devices, both in the air and on the ground, is a thrilling tale, pulsating with the will to protect the helpless civilian. Its partial success (as we read from General Grove's own account) was the result of excellent organization and speed, as well as lack of aim of the attacking planes and the important development of defensive aërial lighting.

When the war started the principal Allied nations had in all about seven hundred planes. At the close of the war Great Britain had 14,000 planes, France 12,000, Germany 11,000, and the United States 10,000, showing the remarkable expansion in the industry and the more than remarkable response of the people back home to the emergency need. If such production rates have been achieved once, they can be again, with more telling results. The increasing rôle of the airplane in the World War is a history in itself. In recalling those war days and the general ineffectiveness of bombing, it must be recalled that the war bombs weighed only about fifty kilograms and their radius of action was therefore very small, the bombs about equalling in destructiveness a gun of the two-hundred-millimeter calibre. Scouting planes in those days had a radius of action of barely 150 kilometers and bombers ranged about 500-600 kilometers. The maximum speed of an airplane in 1914 was 110 miles per hour. We saw then the infancy of the aërial arm, and its growing strength and effectiveness as the war progressed.

Before soaring aloft into aviation figures and facts, let us

do some good ground work by studying the growing aviation industry—first its development in the various countries and then the degree to which it is stimulated by government subsidies, unceasingly provided.

Development of the Aëronautical Industry through National and International Competition

Situated in every major industrial nation today are plants for the manufacture of airplane bodies and engines. This statement contains two important implications. First, this noteworthy development of national aircraft manufacturing is in line with the tendency of industrialized nations to try to become economically self-contained, a general policy which is bound to end in failure, despite the tons of words already written and spoken and those still to come. Every national balance sheet shows exports to and imports from other countries. That is national economic health. Complete national economic isolation of any industrialized nation is national decay. No industrialized nation dare go the limit on that dangerous road, although it seems as if nations delight in skirting near the limit for the thrill of the danger involved.

Secondly, the exportation of aëronautical products leads to a keen competition between manufacturing countries which has called forth bad feeling between national producers underbidding and underselling each other. In 1929, United States exports in planes and parts were valued at \$9,345,606; in 1930, \$8,802,635; in 1931, \$4,810,531; in 1932, \$7,900,000. Central and South America have been consistently our best customers, with Mexico at first, and now Brazil, the largest purchaser in this group. In Europe, Soviet Russia has been, on the average, the best customer. In Asia, China in 1931 and 1932 absorbed increasing quantities, totaling, in 1931, \$908,526 in value. The practice is to send abroad only those models which are outmoded at

home by new inventions, since the latter are, at the time, jealously guarded as secrets for national defense. Each nation having an aircraft industry has entered the export field as one important means of keeping the home industry going.

The outcome of this steady export in planes and parts is this: the airplane companies are furnishing other countries with aërial *potentiel de guerre*, which may sometime be used against the manufacturing country itself. As we shall see, every airplane has some possible military use for which it may be destined in case of emergency.

Of course this objection to the continued, uncontrolled international competition in the manufacture and exportation of speedier, more powerful planes, with longer cruising radius, is in the same general class with the objection to the shipment of arms and ammunition to non-producing countries.

We are arming potential adversaries. In the case of airplanes we are furnishing them with competitive aids to industry and to national development, and at the same time helping them to arm for war. We are constantly furnishing other countries with recent models, thus giving our secrets of yesteryear to others and spurring on between companies at home a continued competition, so keen that an extra mile of speed gained from a new engine is hailed with boundless joy. Where will this uncontrolled competitive mania for speed and plane performance lead?

There are in the United States more than 20 companies manufacturing for the Army and Navy specified planes for defensive warfare, as well as four companies specializing in aircraft engines. (As in the case of chemical warfare, so in the case of aërial warfare, when can the difference be established between preparation for offensive and preparation for defensive warfare? There is no difference. To defend, one must rise to attack; in attacking one may be rightly said

to be on the defensive also. All war today is both defensive and offensive, and an attempted distinction between them in international pacts vitiates the effect of such pacts.)

These American manufacturing companies working on government orders in fighting planes are making new models for the Army in pursuit planes, planes for ground attack, and in observation, training, bombing, and transport planes; for the Navy they are working out the newest ideas in fighting, observation, training, and patrol planes, as well as amphibians.¹

The rate of possible expansion in airplane production for other countries is very difficult to estimate because: first, it depends on the industrial strength and mobility of a nation in many branches of its industry—such as airplane motors, fabric for wings, or armored bodies; and, secondly, the willingness of the people to stop all other work to make airplanes for a war emergency. People did this to a remarkable degree during the war, and will again be called upon to do so in a like emergency. In other words, airplane factories as such will be used to develop the types of planes for the new emergency, and industry as a whole will turn out the standard makes of planes according to M. Henri Bouché,

¹ The following significant statement is culled from a report of the President's Aircraft Board in November, 1925:

"We estimate that the aircraft industry of the United States can be counted upon to contribute to the air strength of the United States during the first twelve months of a major emergency calling for the mobilization of the entire industrial resources and man power of the country, approximately 15,000 airplanes. This production would, of course, come in gradually, starting at a moderate figure and increasing steadily throughout the year. While the first year's requirement of our military and naval services might not be met by this production (dependent upon the rapidity with which the other phases of our military and naval programs go forward), it is not apparent that any other power could make appreciably greater progress toward meeting its aggregate requirements within the first twelve months of a war. During the second year of the war new plants constructed or converted for mass production during the first year should be capable of bearing an increasingly greater proportion of the total war load, and it is probable that, at the end of eighteen months, if not sooner, our aggregate monthly production would be measurably greater than that of any other nation. In this connection it should be borne in mind that our geographic situation makes dire urgency of aircraft at the beginning of the war far less important for us than for European countries."

an outstanding French aviation expert. This allows for great expansion, its possible degree being based on existing industrial strength.

The airplane industry, just as the chemical industry, is under direct and indirect government subsidy and control. Artificial stimulation through high tariff walls is, of course, a part of the picture. With such protection in varied forms, the airplane industry is reaching new heights of production impossible to attain were it dependent only on its own initiative. Military orders are keeping the factories going at the present excessive rate.

The airplane industry in each country depends on the government for national army and navy orders to keep it alive, for, at present, civilian demand, including that for commercial planes, though steadily increasing, is not sufficient to keep up the industry as established for war purposes. Hence the introduction of new models, bringing new competition in engine performance, is also considered necessary for the continuation of the industry, especially since replacements are slow in peace time.² As we shall see later when the question of subsidies is discussed, the interrelationship between peace-time aviation and war uses is strengthened from every angle of approach—from manufacturing to landing fields—and is continuous throughout. Thus is developed that aerial reserve on which a nation counts in time of war to battle down the will of the enemy nation by direct attacks on centers of government, on industrialized areas, and, inevitably, upon the civilian population.

² For instance, Earl Findley, editor of *The United States Air Services*, says in an article entitled "Our Speedy Conquest of the Air" (in the *Literary Digest* of August 19, 1933):

"The five-year air programs of the Army and the Navy were initiated partly for the purpose of enabling the aeronautical industry to become thoroughly established by providing from military sources a regular and even flow of construction. It was believed in 1926 that in five years the demand for civil airplanes would increase sufficiently to provide the bulk of new business. That this result has not been attained is primarily due to the economic depression."

The United States had consistently built on an average about one-half the total airplane production of the world, though today this proportion has fallen slightly, giving way to French competition. A reserve army or navy officer is in direct charge of each manufacturing plant producing military and naval planes, either as a supervisor or as a paid member of the staff, in every manufacturing country.

The circle which international competition in the airplane industry has set up is not different from that in any other industry with international markets as the goal, but in this particular case the quick convertibility of civil planes into war planes and the increasing manufacture of war planes leads, without doubt, to increasing intergovernmental suspicion, which increases the danger of war.

When the German DoX appears, a monster plane with twelve motors, three decks, and accommodation for one hundred people, a ripple of intense interest is shown in each airplane-manufacturing country, and a determination either to outdo this aërial monster or to protect against her potential bombing raids, if she should be so used. One result? The French are developing a 350-horsepower stratosphere plane, to go up eleven miles, with a hermetically sealed cabin and an automatic oxygen system to supply the pilots and passengers. M. Farman, the veteran French aviation enthusiast, is supervising the construction of this plane. This is simply one incident in this ceaseless competition between countries for airplane supremacy, which expresses itself in volume of manufacture as well as in the development of new models.

Encouragement of Civilian Flying to Provide an Air Reserve

In the new field of private aviation, emphasis has been put on low cost aircraft to induce the civilian to fly and to form flying clubs, which are encouraged not only by the

industry itself but also, in many cases, by the respective governments.³

This emphasis on the development of civilian flying not only helps airplane companies (who are now putting out new models yearly to catch the interest and whims of the men and women who want to fly—just as the automobile industry found it profitable), but, in addition, as each new pilot has to be licensed and his plane licensed by the national government, a close check is kept on potential war pilots and planes. Separate statistics are kept for military, naval, mail, commercial, and private pilots and planes, and are so published.

Those of us who recall the hectic, terrifying days of the German drive toward Paris in 1914 also recall the interesting rôle of thousands of Paris taxicabs which were commandeered to carry the Poilus to the front. Automobiles of every kind

³ In an enthusiastic newspaper account of a recent American aircraft show, the reporter describes a new model for sale at \$4,595.

"Take for example the four-cabin Stinson Model R, a high-wing monoplane with 215 horsepower Lycoming motor, which sells for \$4,595 at the factory. In addition to such features as those Bendix products, the direct drive electric starter, scintilla magneto, and Stromberg carburetor, the standard equipment includes Hamilton steel alloy propeller, self-energizing foot brakes and parking ratchet, engine instruments, navigation lights, non-shatter glass, instrument panel indirectly lighted, whipcord upholstery, ash receivers for pilot and passengers, map pockets, cabin side lights, toggle assist cords, chrome-plated rudder stirrups, adjustable pilot seats, cabin heaters and ventilator.

"Except for such items as are peculiar to the air, one might be reading the specifications of an automobile of 1932.

"Passenger and pilot comfort has received a deal of attention in a number of the planes below the transport sizes. In the Wasp-powered small Bellanca there is an adjustable, high-back seat, which can be thrown back to become a bed.

"Among the very small planes at the show which emphasize economy of operation as well as low initial cost, the Nicholas-Beazley trainer is attracting interest. Its makers contend that it can be operated for a little more than three cents a mile, including depreciation, hangar rental, mechanical repairs and all charges, including fuel, and claim a cruising speed of ninety miles an hour and top of 110. It is a parasol monoplane with folding wings, cowling ring, hydraulic landing gear and air wheels, powered with the British-made Genêt motor of eighty horsepower. It sells for \$1,990.

"One of the late comers at the show is the Cub, made by the Taylor Aircraft Company, a little two-place, dual-control monoplane with parasol wing, powered with a forty horsepower Continental engine, and selling for \$1,350."

were used for some form of war work. Then, in every country possessing seagoing craft, we remember that almost every good-sized boat with a certain degree of sea-worthiness was commandeered for naval use at home or abroad. No stretch of the imagination is necessary for us to visualize the use of all airplanes for some form of war use, at home or abroad, should the need arise. From the smallest to the largest, all sizes can be and are planned to be used for varying types of military purposes. Therefore the reason for interest in and expenditures for civil aviation on the part of governments is clear.⁴

Private flying is on a larger scale in the United States than in any other country because of our favorable large geographic expanse, uninterrupted by national barriers, our well-established industry, our well-developed flying fields and inter-field service, and our unusually mechanically inclined citizenry who received as enthusiastically first the bicycle, then the automobile, and now the airplane.

In 1928 there were 1,500 licensed planes in service in the United States; in 1929, 3,125 planes; in 1930, 4,974; in 1931, there were 6,057 licensed planes and 18,000 licensed pilots; in 1932, 10,780 planes and 17,739 licensed pilots. This is a very interesting tendency which will be greatly accelerated in the future as planes become more "fool-proof" and as civilians become more enthusiastic about flying. Classification of ownership of civil planes is quite revealing of present remarkable tendencies of private American airplane ownership:

⁴ A quotation follows from Mr. Warner's article on "Foreign Activities":

"It appears that the American government spends on the promotion of civil flying about a third more than France, Germany, and Great Britain together. The American government, however, gets more for its money than do those of most European countries. The airplane mileage flown in air transport under the American flag was more than three and a half times the combined totals for the three countries just mentioned. The American passenger mileage is three times the aggregate passenger mileages of the other three."—*Aviation*, March, 1932.

Airplanes Owned (1932) by

Airplane manufacturers	489
Dealers, distributors, flying services	1,755
Schools	107
Air transport companies	561
Oil companies	73
Other non-aëronautical corporations	138
Flying clubs	175
Individual owners	3,938
Federal government departments	50
State and municipal governments	19

Civil flying and civilian pilots in the United States, thus continually on the increase, may, with the return of more prosperous days, keep the factories so busy that a reduction in military orders will not be considered such a catastrophe as at present. What a complicated future is foreseen if such a slogan were broadcast, "To every citizen his desire—health, prosperity, and his plane." On the other hand, this probable increase in private and commercial flying strengthens American opposition to the internationalization of civil aviation. This aspect will be discussed in detail in the chapter on the internationalization of aviation, but needs to be mentioned here for its partial setting. The same tendencies, both in distribution of private planes and in the encouragement of private flying is to be noticed in the aërial-minded European nations, such as France, Germany, and Italy, and, to a lesser degree, Great Britain, for her geographical position is not conducive to the encouragement of much private flying.

There is one angle to the complex problem of controlling aviation for peace purposes which needs emphasis, namely the uneven development as between nations of military and civilian aviation. We find government control exercised either through a strict licensing system, as in the United States; the complete suppression of civilian flying, as in Soviet Russia; or a close supervision of commercial and

civilian flying by the government with emphasis on military features in all commercial planes, as in Italy. In Russia we find a strong military aviation arm combined with government emphasis on civilian interest by means of aviation clubs, with school children collecting kopekes for bombers. The Russians have one powerful state aviation industry, the United Aircraft Industries of the U.S.S.R.

Subsidies to the Aëronautical Industry and Commercial Aviation for Military Preparation

Because government interest in private and commercial aviation of today and tomorrow is concentrated on its use as an arm for national defense in case of need, every commercial airline (which includes all mail lines) is subsidized by the respective government, which may grant aid in any of various forms. Such financial aid keeps many if not most of the lines in existence, for income from passengers could not, at present, meet expenses even halfway. For instance, even though mail and express make up only 23% of the traffic on American air lines, and 77% is passenger traffic, the American Government is spending 30 cents per passenger mile on civil aviation up to Feb. 20, 1934. Hence, as the passenger fare is only 6 cents per (passenger) mile, the contribution of the government is five times that of the patrons. In France and Germany the government subsidy is 50 cents per equivalent passenger mile, and the total outlay in indirect subsidies is 40 cents in France and 20 cents in Germany. It is noteworthy that 60% of the world's passenger transport by air was in the United States in 1932. This record is steadily on the increase here.

Such government aid also permits the extension of strategic lines which could never hope to carry their own expenses. French airlines to northern Africa and Indo-China are examples of one government's subsidized air lines for strategic

purposes. British air lines to and around Africa, India, New Zealand, Australia, binding the Empire in an air net, form another example. These government-subsidized airlines are a recognized part of the magnificent development of far-flung aviation, but a difficult obstacle to internationalization.

Subsidies for national aviation are so interesting and so important from the point of view of government interest in aviation for both peace and war uses and quick convertibility from one to the other purpose that the following table has been taken bodily from Edward P. Warner's article on "Foreign Activities" in the March, 1932, issue of *Aviation*. This table, if studied carefully, brings out the following: first, the granting of heavy government subsidies because of the value of civilian aviation to national defense; second, the question: Where will this policy of increasing government support of aviation, by large and small nations, if continued, lead? Mr. Warner says:

"A comparison of aëronautical expenditures has been made in tabulated form, but it requires some little explanation. There are many gaps which could not be filled even after study of all the records available in this country. It is impossible to secure strictly comparable figures for parallel listing for the various countries. The definition of the term 'subsidy' varies from place to place. Still more variable is the determination of what should be included within the appropriations for civil aëronautics. In France, and in a number of other countries to a lesser extent, there are general services which have both civil and military functions and which can not be split up between the two.

"In general, the attempt has been to include charges for the regulation of aircraft, for airway development, and for research bearing exclusively on civil employment of aviation. In short, the items have been set as nearly as possible in parallel form with those of the budget of the Aëronautics Branch of the Department of Commerce. It is not always possible to make such a separation, however, and in some cases meteorological service and other auxiliary expenditures are included. Very special cases are those of Germany and Austria, which are prohibited by treaty from having any military air force, and which must, therefore, charge all their aëronau-

tical expenditures to the civil division. In Germany a large amount of miscellaneous research, developmental and administrative work that would be carried on in any other country by the Army or Navy has to go down as civil expenditure." (See following table.)

FOREIGN SUBSIDIES AND APPROPRIATIONS
(in thousands of dollars)

Country	Direct Trans- port Subsidy	Total for Civil Aëro- nautics	Total for Military Aëro- nautics	Total for All Aëro- nautics
North America				
Canada	—	4,960 †	3,200	8,160
Europe				
Austria	242	328	—	328 *
Belgium	650	2,300	—	—
Czechoslovakia	565	1,075	—	—
Denmark	166	97	736	833 *
Finland	11	50	750	800 *
France	7,840	9,210	90,790	100,000
Germany	4,480	9,790	—	9,790 *
Great Britain	2,290 ‡	3,210 ‡	100,000 ‡	103,200 ‡
Hungary	—	35	—	35
Italy	3,220	3,890	49,900	53,790
Jugoslavia	141	156	4,220	4,376
Netherlands	402	474	4,500	4,980
Norway	2	25	1,170	1,195
Poland	1,210	1,182	8,740	9,920
Roumania	325	325	9,075	9,400
Russia	—	12,000 §	20,000 §	32,000 §
Spain	300	494	3,773	4,267
Sweden	160	219	2,510	2,729
Switzerland	90	115	1,326	1,441
Africa				
South African Union	224	228	750	978
Asia				
India	470 ¶	1,725 ¶	—	—
Japan	1,360	2,270	36,400	38,670
Oceania				
Australia	474	962	2,615	3,577
New Zealand	—	56	—	—

* Definitive figures unobtainable.

† Also \$1,912,000 paid out on air mail contracts. Air mail income unknown.

‡ British civil aeronautical expenditures given are net, with amounts repaid by Dominion and colonial governments excluded. Military appropriations and total are gross, including expenditures borne by the Indian government, since the Indian air force is essentially a part of the Royal Air Force.

§ Russian figures are based on an assumed purchasing power value of eleven cents per ruble. If the ruble be taken at its normal value of fifty cents, which is required in official exchange transactions, the total expenditure would be \$145,000,000.

¶ As noted under ‡, Indian military figures have been transferred to Great Britain. The Indian expenditure on civil aviation goes largely into the preparation and maintenance of ground facilities for Imperial Airways' Empire Service.

It is very significant of future trends of aviation in peace or war that all government subsidies are advanced to private companies on the distinct, written understanding that commercial planes shall be turned into war planes, whether bombers, pursuit, observation, photographic, or training planes, when the government concerned needs it, to meet an emergency. This stipulation is the key to government subsidies in all countries. This is one aggressive and extremely dangerous angle to government control and sponsorship of aviation.

This interrelationship between government subsidies and commercial aviation has many interesting facets. It has developed extensively since the war, for then has the value of an efficient air reserve been recognized. The reasoning on historical analogy is this: just as the Navy owed its origin to mercantile enterprise (for ships going into foreign ports had to be protected), so in the same way must military air power be built up on a basis of commercial air development. Both France and England as well as Italy and the United States count their commercial aviation and commercial pilots as military air reserve. "A large commercial air fleet will provide not only a reserve of men and machines, but it will keep in existence an aircraft industry, with its designing and constructional staffs, capable of quick and wide expansion in emergency."⁵ Then, of course, the next logical step in this reasoning is the reverse,—“Military air supremacy can best be assured by the intensive development of industrial air organization for commercial purposes.”

In the event of war in Europe, that nation may win which has three factors to its credit: a well-organized military air force, a well-organized civil air force, and a well-organized aircraft industry, with industrial support, to turn out machines in great quantity. These were the lessons of the

⁵ Sir F. H. Sykes, in *Aviation in Peace and War*.

Great War. What have the military minds decided for the next war on the basis of such aërial preparation? "The war lasted long enough to prove the effect of the strategic offensive by air. In spite of the dictates of humanity, it cannot be eliminated. It is true that modern war is inimical to the progress of mankind and brings only less suffering to the victors than to the vanquished. To ensure peace should be our ideal. But a great war once joined is today a war of the peoples. Not only armies in the field, but also men, women, and even children at home, are concentrated on the single purpose of defeating the enemy, and armies, navies, and air forces are dependent upon the application to work, the output of war supplies and, above all, the morale of the civilian population." Just as gas was used notwithstanding the Hague Convention, so air war, in spite of any and every international agreement to the contrary, must be carried into the enemy's country, his industries will be destroyed, his nerve centers shattered, his food supply disorganized, and the will power of the whole nation shaken. Formidable as is the prospect of this air warfare, it will become still more terrible with the advent of new scientific methods of life-destruction which it alone makes possible, such as chemical and bacteriological attacks on great industrial and political centers. Various proposals, such as control of the air arm of all nations, military and civil, by the League of Nations, and even the complete elimination of aviation, have been put forward as a means of avoiding the horrors of aërial warfare.

A future war, undoubtedly, will begin something after this manner, provided either side possesses large air forces. Huge day and night bombers, pursuit, attack, and observation planes, will proceed at the declaration of war (or before its declaration) to penetrate into the enemy's country for the attack of his centers of population, his mobilization zones,

his arsenals, war industries, harbors, strategic railways, rolling stock, and shipping. Reserve air Army squadrons will concentrate in formation to accompany the Army to the front; reconnaissance and fighting patrols will scatter in all directions from coastal air bases to discover and bomb the enemy's concentrations and cover their own; the fleet will emerge, perhaps, with its complement of reconnaissance and protective machines and torpedo aircraft for direct action against the enemy's fleet. A few fighting defense units will remain behind.

"But it must not be imagined that these functions will be carried out unopposed. Local battles in the air will occur between fighting machines . . . while the main air forces in large formations will concentrate independently to produce, if possible, a shattering blow on the enemy and obtain from the outset a supremacy in the air comparable to our supremacy on the sea in the last war.

"In mobilization the time factor is all-important. Our national history has been one of extraordinary good fortune in this respect (speaking for England), but the margin allowable for luck is becoming very narrow and, whereas in 1914 it was some twenty days between the declaration of war and the exchange of the first shots, in the next war the air battle may be joined within as many hours, and an air attack launched almost simultaneously with the declaration of war. In modern war the mobilization period tends to shorten, and every effort will be made towards its further reduction, since mobilizing armies are particularly vulnerable from air attack."⁶

In quoting this description by a noted English authority, written in 1922, concerning the next war, it has been deliberately chosen for its quiet authority and the fact that eleven years have elapsed since this was written. In this span of time new inventions have been added to the development of aviation, making the picture of war at such a moment much more lurid than even this far-seeing General could have predicted. The interest, financial and mili-

⁶ Major-General Sir F. H. Sykes, *Aviation in Peace and War*.

tary, in air development which governments are constantly showing encourages the direst predictions. National commercial aviation is the backbone of national reserve and aerial preparedness. This preparedness has developed remarkably since 1925 and with sinister implications for the non-combatant.

National and International Rivalry in Continued Development of Commercial Aviation as an Air War Reserve

You may soar aloft in the United States over the routes of thirty-four operating companies, for passenger, mail, and express service. More than 1,713 airports serve 10,780 licensed operating planes. This phenomenal development has occurred during the last twelve years and marks a transition stage in the continued progress of aviation within our borders.

One powerful airline, owned and operated by Americans, the Pan-American Airways, is interested in our southern neighbors. It flies the routes over the Central American republics and the Caribbean, with a total mileage of 9,730. In coöperation with the Pan-American, Grace Airways also flies the South American route, the full extent of the lines reaching to Santiago, Chile, and Buenos Aires, Argentina. There is a Pan-American Dobra Brazil Company, and a Mexican Aviation Company. When it is realized that North American investments in our Latin-American neighbors totals about \$4,917,000,000, one can readily understand the advantage of keeping the air transport service of the western hemisphere in North American hands and under North American control. This aerial extension of the Monroe Doctrine has far-reaching consequences, not only for helpless southern republics but also for our part in world organization. This aspect of aviation deserves a major portion of a book in itself. In passing here so quickly over it, we

are simply indicating a phase of study which will evolve as realities become more clearly understood.

Now, with the western hemisphere thus airily skimmed, let us settle into the far-flung British commercial air service, which spans the globe, covering an empire on which the sun never sets. As I write, the map of the British Empire Air Routes is spread before me. There is a lasting thrill in the evident intrepidity of such a mammoth undertaking. Two main external routes are readily seen. From London through Vienna, Salonica, Athens, Alexandria, Cairo, Khartoum, and so on down the east coast of Africa as far as Cape Town and back up the west coast, a total distance of about fifteen thousand miles; the flying time cuts by one-third the time it used to take to deliver mail or passengers by steamer.

The second British air mail route, leaving London, the hub of the Empire, goes as far as Alexandria over the same route as the first or African route, then sharply branches east, follows through such historic and mysteriously named places as Baghdad, Gwadar, Karachi, Hyderabad, Delhi, Calcutta, on to Rangoon, Singapore, Batavia, Samarang, to Sydney, Australia, a total distance of 12,570 miles. This has only been fully established within the last year or two, uniting sections which had been operating for many years since the war. The miracle of it, however, is that a plane in 1914 could fly only one hundred fifty to two hundred miles from its base. In 1919 an airplane could fly only 300 miles from its base. Today, with adequately spaced landing fields, fully equipped, with more powerful engines than were ever dreamed of in 1919, the plane spans the world. The long distance record is 5,000 miles and is being extended as I write. This, of course, is only a transition stage to greater accomplishments.

Picture a map of the world spread out flat and then

visualize the criss-cross of airlines of all nationalities, intertwining their aerial pathways, and some slight conception of the intricacies of modern commercial aviation from the international point of view is gained. To enable you to visualize the actual situation today there follows a list of the countries operating main trunk air routes. Afghanistan, Australia, Austria, Belgium, Brazil, Canada, Chile, China, Colombia, Czechoslovakia, Finland, France, Germany, Great Britain, Holland, Hungary, Italy, Japan, Mexico, Peru, Poland, Portugal, Russia, South Africa, Spain, Sweden, Switzerland, the United States.

This tendency toward manifold aerial overlordship is also to be noted in Africa, where British, French, Italian, Portuguese, Dutch, and Belgian lines are operating and further lines are projected. Of the other parts of the globe China is the only large territory sparsely covered by aerial lines. Such sections as Canada, Australia, the interior of Soviet Russia, are being filled in rapidly with airlines as the years pass. In summing up these observations it must be clearly kept in mind that the theory of regional political agreements, based on the fact of regional control by a supervising power, or a group of powers, is breaking down in the face of continued uncontrolled development of interweaving international commercial airlines. Distant colonies and mandates are becoming restless under this constant threat. This applies to the Far East as it applies to South America, to Africa as to Europe.

Most of these countries publish government bulletins noting the progress of commercial aviation in other countries which is so jealously watched by one and all. The highest per capita appropriation for civil aviation is that for Canada, which spends 65 cents a year for every resident in the Dominion; next Belgium, with 30 cents per person; then the United States, with an outlay of 25 cents per capita.

New lines opened by one country are quickly reported by the other countries. Powerful nations with large aëronautical interests have placed in their embassies to other major nations air attachés who, like the military and naval attachés, must keep a careful watch on air progress, commercial as well as military and naval, of the respective countries to which they are accredited and report their observations back home to the proper authorities as rapidly as needed.

Under separate national financing, strict national control, and complete national registration, as well as through the aid of government subsidies for national airlines, national commercial planes with their pilots are ready for instant convertibility into war air forces. Commercial pilots as well as civilian pilots are registered reservists for the air force in every European country sponsoring aviation in one form or another. In the United States about seventy-five per cent of the commercial pilots have graduated from government military aviation schools because these government schools are both cheaper and better than private aviation schools. Upon graduation from the government schools, each pilot holds his commission in the Army aviation section, even if he goes into civil or commercial aviation, and retains this commission so that he is eligible to fly Army planes. Thus the connection between civil pilots and Army pilots, ready for an emergency, continues to be very close. Those pilots who are not graduates of Army aviation schools can be used as flying instructors when raw recruits come pouring in. As for the aircraft industry, it is a strictly national affair, under close government supervision and, in most of the producing countries, such as Italy, Russia, and France, is under direct government control and ownership.

The expansion of commercial aviation is bound to follow the economic crisis and world-wide depression from which the nations are now suffering. Some day—not too far away

—there will be as many private planes as there are automobiles now,—and possibly more. This development is in a critical state at the present time for two reasons: first, uncontrolled aërial expansion under conflicting national policies, without international agreements, leads to uncontrolled suspicion between nations; second, the quick convertibility of commercial planes into planes for varying war uses, and commercial and private pilots into war pilots, is incontestable, threatening national security and retarding peace-time aërial expansion.

Here lies the main difference between the development of nationally owned and controlled steamship lines and nationally owned and controlled aërial lines. The conversion lag, or, in less technical terms, the time element in changing from peace uses to war uses measures the degree of adaptability for war uses as well as the degree of defense to the owner nation. For steam and motor vessels, regardless of reënforced decks now ready for guns, it takes days and weeks of time to return to home ports if the sea lanes are still open, and then further weeks of precious time for structural changes to convert commercial vessels into adequate war vessels. A bomb rack, on the other hand, added to any tri-motor commercial plane, makes a bomber within an hour. Commercial planes used for express freight are ready pursuit planes, etc. This quick aërial convertibility makes every type of plane ready for almost immediate action.

Spread out before me is a map of the world showing the criss-cross of national steamship lines, covering the seven seas, touching every navigable port. Compare that map with that showing main trunk air routes and the similarity of objective and difference in time required to reach those objectives is marked. Here lies the nub of the menace of aërial navigation: its directness, its constant proximity to home or friendly bases, its increasing commercial expansion

to the far corners of the globe, irrespective of such obstacles as bodies of water or mountain barriers, its immediate convertibility to war uses wherever a given airplane may happen to be.

The implications for the non-combatant are most serious, for such aërial conflicts in war time despite feeble attempts at zoning or limiting aërial battles, have wrought havoc in the past with the non-combatant in the bombing area, and will wreak more havoc wherever and whenever they occur again.

The complication of manifold air routes and nationally subsidized companies, each striving for trade and increased speed, is further aggravated by the startling fact that no international aërial code has been accepted by all operating companies or interested countries to regulate this confusion, worse confounded. Certain regulations as to the common use of airports, a few internationally observed regulations for lighting markings and for ground signalling are the only commonly agreed upon international rulings. The one outstanding, unifying regulation which binds together this helter-skelter of international aviation today is the airmen's unwritten code, a code so well understood by this fine band of fearless men that no crystallization into law seems to them necessary. Help in time of need, regardless of rivalry in plane performance, a mutual respect—these govern the otherwise chaotic situation in air rules today.

During some weeks in 1932, in the French aëronautical periodical—*Les Ailes*, answers to three significant questions on the fraternization of all airmen, enemy or allied, raised a storm of discussion. The questions, based on a remark of the Swiss Air Chief, Major Ackermann, in his article in the *Swiss Military Review*—are as follows—1, Is it true that during the World War, aviation did not render all that was expected of it because of the spirit of chivalry which even

enemy airmen showed one another? 2, In the possibility of an armed conflict, is it not possible that this deep camaraderie which aviators express to one another, will militate against their national duty? 3, Is it wise for the aviators of the entire world to persist in cultivating this chivalric spirit and this jolly camaraderie?"

Answers varied with the writers, ranging from one extreme to another. But the chivalry of the air goes on regardless. Only those who have flown and those who are pilots know that feeling—too deep for words—the instinct to help or share with a fellow aviator. The knighthood of the Middle Ages, going forth on horseback has flowered again in the aviator, rushing through the skies. Sir Galahad (at times he looks like Don Quixote) wings his way now through the air here, there and everywhere, to succor and to assist, staying only to joke over his adventures and to cheer others on the way. The aviators of today are the knights errant of yesterday. Even air rules cannot stop them, they make light of everything—but the air. In a later chapter a full discussion of the attempt to regularize commercial air transport, by attempts to put in force air rules, will be reviewed.

Effect of Inter-Continental Expansion of Aviation on Regional Political Agreements

There is one other aspect of this intertwining of tenuous aërial, commercial air lines, owned by many nations, which must be stressed for its present political effect and its future implications. Naturally, in the criss-crossing of commercial aërial lines reaching various parts of the earth in their endeavor to bind colonies and dominions to the mother country, regional political supervision by one protecting country is diminished. For instance, in mentioning the supremacy of Pan-American Airways, a North American owned and directed corporation whose planes fly the South American

route, there was recognized the need for a new interpretation of the Monroe Doctrine from the point of view of air developments. It is noteworthy that French, German, and Spanish lines are now flying regular routes to South America, reaching and competing for a lucrative trade which had formerly been more exclusively American. The cost of aerial transportation of express and mail from Europe is more nearly equalized with American rates in this manner, and hence the competition is keener. This has its obvious reflections on political observations in that the South American countries feel themselves growing tangibly closer to Europe than in the old days when steamers took three weeks for the trip from Cherbourg to Buenos Aires. Such imperceptible political changes as will follow these physical changes, through the concomitant lessening of the strength of such regional doctrines as the Monroe Doctrine and the developing strength of world organization will be scrutinized in detail in our last section.

From another angle, such far-flung aerial lines attempt to hold together scattered empires, and through the potential convertibility of commercial aircraft for war purposes, the airlines are so developed and subsidized by the respective home governments. The deep influence of aviation on political line-up is still too confused to be understood. However, signs of restlessness and readjustment are apparent everywhere, greatly due to the increasing and deepening effect of aviation on our national and international economic and political structure.

Summary and Conclusions

During the World War, aviation, still in its infancy, proved even so, of such material help that its further development was ordained. Immediately, on the close of the war, there started under direct and indirect government subsidy, an

airplane race which is having serious repercussions on national and international life. In the commercial sphere, there has been developed national air lines carrying passengers and freight to other nations. The very life of this network of criss-cross aviation lines depends upon its international character. Government encouragement of civilian flying and flying clubs has as its basis the usefulness of such trained pilots in war time. National rivalries in commercial development has also the same aim—an air war reserve. The effect of this intercontinental aerial expansion, constantly increasing and expanding, on political boundaries and regional commitments is a subject still to be fully explored. But the rivalries which this national competition in aviation construction, export and performance is creating, are serious in the extreme, for commercial aviation is readily converted into war aviation.

Conclusion—increasing commercial aviation may be regarded by some aviation enthusiasts as the backbone of national security, but, through the very power for widespread destruction which this uncontrolled expansion in national commercial aviation involves, national and individual security against this air menace demands some form of internationalization of commercial aviation. This is one of the most effective means of removing the fear aroused and continually on the alert as the result of this unceasing national competition.

CHAPTER III

MILITARY ASPECTS OF MODERN AVIATION

HERE is indeed a thorny subject, bristling with overt charges, suppressed documents and dossiers, backstairs gossip and secrets, guarded factories, mysterious signs, and carefully guarded announcements of engine performances.

Short History of Restrictions on Military Aviation before the World War

Aircraft had not been considered a serious menace when the Hague Conference in 1899 unanimously agreed to a Balloon Declaration, to be binding for a period of five years, prohibiting the use of aircraft in war. Quite a different situation, however, faced the delegates to the second Hague Conference in 1907. Although this conference had been called for the purpose of reënacting and, if possible, of increasing the restrictions upon warfare which had been adopted in 1899, the fact was apparent that newer forms of aircraft were proving to be of more practical usefulness than balloons. Two of the major powers, France and Germany, had already incorporated aircraft into their military establishments. This move created sufficiently formidable opposition so that the renewal of the prohibition which had lapsed several years earlier was prevented.

By that time both France and Germany were using three kinds of dirigibles,—rigid, non-rigid, and semi-rigid, and France already was experimenting with several types of heavier-than-air planes, since these had obvious advantages

in speed, independence of the wind, and comparative cheapness. Besides those two countries, Italy had started building dirigibles and Russia, smarting under her defeat by Japan, had since 1905 started a similar program which placed her third in air strength by 1910, with only France and Germany superior. The nations seriously demanding restriction or prohibition in 1907 were Austria, Great Britain, and the United States, of which the last had neither government dirigible nor airplane in 1907, nor had Congress up to that time passed any national appropriation for aviation, being very skeptical of its practical value. The British attitude, moreover, was based not only upon the fact that the nation possessed but one rather useless airship, but even more particularly upon the fact that English isolation was ended by the coming of air power, and the security of the "tight little island" could no longer be guaranteed by her navy as before.

A curious fact in this connection was that Italy, while wishing to keep her dirigibles and to be free to build more, feared the possibility of unmanned balloons directed by wind or wireless, which might automatically drop bombs over a given objective, and hence wished these to be prohibited. This fear grew, perhaps, from the memory of an Austrian bombardment of Italian towns from balloons in 1849.

The preponderance of opinion was in favor of legitimatizing aerial warfare, and the result of the conference on this point may be summed up in Article 25 of the agreement adopted, which reads as follows:

"The attack or bombardment by whatever means of towns, villages, dwellings, or buildings which are undefended is prohibited."

Who can be certain whether a town or village is undefended when the attack is on? This prohibition is valueless, as was proven in the World War.

Thus military aviation was to be allowed, subject only to a restriction similar to rules which were supposed to be observed in warfare on land and sea, and the possibility of dealing death and destruction by means of aircraft was definitely established. Thus it will be seen, as had been the case in earlier attempts to outlaw the use of torpedoes and dum-dum bullets, that no really effective weapon will be voluntarily given up by nations which may possibly have use for such a weapon. The effect of any international gathering considering its abolition will rather be to legitimize it by surrounding the use of the weapon with supposed safeguards.

A further tendency to be noted is the increasing danger to the non-combatant. The immunity of the civil population was presumably recognized for all time by the Brussels Conference of 1874, but with the emphasis of modern warfare on field tactics in place of the old attacks on fortified towns, it was much more difficult to define the non-combatant and to leave him untouched in military engagements.

With regard to aeronautical performance in 1907, it should be noted that the average speed of an airship was about forty miles per hour, and its flight endurance averaged nine to ten hours. These figures apply to the most powerful airships then in use, owned by France and Germany, so the non-combatant was not greatly exercised. Development of airplane performance before the war was steady, as we have seen, and of course the war greatly accelerated the pace of improvements: Today the non-combatant is in constant danger. Increasingly, as warfare has intensified, the non-combatant has come within the battle range.

Expenditures by the four leading nations for military and naval aviation for the five year period 1909-1913 (as estimated by United States military authorities) look paltry compared with what is now spent in a single year: Great

Britain, \$3,000,000; United States, \$435,000; France, \$22,000,000; Italy, \$8,000,000.¹

Short History of Military Aviation during the World War

In the World War, the Germans began the use of aircraft for military purposes with a raid on Antwerp. Their first raid on Paris, in August, 1914, was soon followed by others, but thereafter Paris was not again raided until the fall of 1918 because of fear of reprisals. Northern French cities were regularly bombed, for they contained troops, and as such were military targets. In one of the more destructive of these raids, on Calais, not even churches, hospitals, and market places escaped. This may be largely due to the fact that bombing was usually done at night, when objects were not clearly distinguishable.

The first bombing raid on England was carried out in December, 1914, and the first Zeppelin raid on that country in the following month. The coast of England was systematically raided in the summer of 1915. The first airplanes had been unsuited to making the trip to England, since their radius was but 175 miles and their maximum bomb-load 500 pounds. Therefore airplanes were used by Germany during the early months of the war for raiding northern France, and the airplane first reached London on its deadly business in May, 1915. Royse states that Zeppelin raids on London continued "well into 1916, causing casualties numbering into the hundreds." By the summer of 1916 English methods of defense were strong enough that the Germans were obliged to stop, at least temporarily.

Airships proved to be impractical as bombers in 1915 in the high altitudes to which they were driven by British anti-aircraft guns. Therefore Germany in 1917 developed the powerful Gotha bombing plane, three-seated, with two

¹ *Hearings before the Committee on Military Affairs, 1913, p. 267.*

engines, and having a bomb-load capacity of 850 pounds. In a giant raid in June of that year twenty machines dropped 126 bombs over London, resulting in 600 casualties of which 162 were deaths. In all raiding the acknowledged aim was the demoralization of the people, although practically all resulted in some civilian casualties.

Austria, on her front, made raids on Italy which brought forth a protest from the Pope because of the damage not only to undefended towns but also to historic and sacred buildings which, like the civilians, were and always will be victims of indifferent marksmanship.

The Allies began bombing German towns in the fall of 1914, such as Düsseldorf, Cologne, and Freiburg. By 1917 these raids had greatly increased, with concentration of attack upon the industrial centers of the Rhineland district.

"It was only the armistice," says Royse, "which prevented the carrying out of general, widespread destruction by allied aerial operations." Preparations for bombardment on a much larger scale than before was under way when the truce was signed. "Had the war continued, the following spring would have seen a six-fold increase in bombing operations."²

An important point concerning all this bombardment is the fact that "the technical development of aerial bombing during the war period was such that indiscriminate bombardment was inevitable." Instead of using cast-off artillery shells, special shells were finally developed, cast in steel. Sighting was at first unheard of, and although sights and bomb racks were introduced in 1915, mechanical methods were not highly developed until 1918. "The probable error of aerial bombing during the first three years of the World War was not even calculable. Bombs might miss their goal by a thousand yards when dropped from a ten-thousand foot altitude. In French and English towns, as well as in the

² Royse, *Aërial Bombardment*, pp. 185, 187.

Rhineland towns, shots were scattered over areas of several square miles, when the only military objectives were perhaps grouped within an area of a half-mile."³

While daylight air raids had been possible up to 1918, raiding had to be limited to the night with the greater development of fast pursuit planes. Marksmanship from the air was practically non-existent and the devastation indiscriminate. It was necessary to make an entire district the target, such as the industrial towns of the Rhineland that were Germany's mainstay in the conflict. The Allies then went in for a program of construction of planes with a larger bomb load capacity and wider radius of action. Those directing these planes found that the only way to concentrate on a particular objective was to lay down fire in a circle, surrounding the object which it was particularly wished to destroy. The dispersion of shots, however, was often wide, due to careless dropping of shells or to the necessity of guarding against enemy planes or anti-aircraft guns.⁴

The fact of indiscriminate bombing, furthermore, was not merely recognized, but it is recorded that the French sanctioned the practice as retaliation for raids by the Germans, while the Germans claimed that they had originally kept within the field of operations but had gone beyond that only in reprisal for attacks on their Rhineland towns. "The fact remains, however, that aerial bombardment increased in direct proportion to the mechanical capacities of the aircraft." This is all important in view of a future war.

While none of the nations engaged in the World War as-

³ Royse, pp. 100, 185.

⁴ To summarize, "Air bombardment, in the last half-year of the war, was thus in reality directed against places, against cities and towns rather than against individual objects. The attacks were not directed altogether against personnel, but the circumstances under which bombing operations were conducted, either at night or in the face of strong ground and air defense, resulted in the actual wiping out of the traditional distinction between civilian populations and combatants."—Royse, pp. 188-189.

sented the right to general devastation for its moral effect, neither side was particular to restrict bombing to the immediate war zone. Both claimed that towns back of the fighting lines contained military objectives which warranted attack. The one guiding principle seems to have been the attack of supposed military objectives regardless of the location or of the effect on the safety of civilians or their property.

Short History of Military Aviation since the World War

Since the war developments in aviation have been such as to make one shudder, for if military aviation could have accomplished what it did during the few years of strenuous effort during the war, with promise of much more complete destruction had the war continued, it requires little imagination to guess what might happen in another war on a large scale. By 1922 speed and range of airplanes were nearly double what they were during the war. Non-stop flights had reached almost to the 2,000 mile limit then and it had been proven that a plane could climb to an altitude of practically 40,000 feet. France was still world leader in air power. In the French air force of today almost half the airplanes are in the bombardment squadrons. There has been continued development of the radius of action and of the possible bomb load. Today (1933) the bombing plane carries a load up to four thousand pounds, has a speed of 150 miles per hour, and a radius of action of 1,115 miles.

Today France still leads, with the greatest number of fighting planes, both active and those in reserve with armies and with coördinated civil air forces; France outranks in fighting planes the combined reserves of the other European countries. The United States has the largest and most powerful naval air force, with France, Japan, and Great

Britain following in the order named. Great Britain has the greatest number of airplane carriers, and has ready for quick convertibility merchant vessels for airplane carriers. Japan and the United States lead with first line planes with their respective fleets. France and Italy lead the other countries with the greatest number of trained pilots in active service. However, if one includes pilots in commercial and civil aviation as potential war pilots (and that they are, certainly), the United States leads with the greatest number of pilots, trained and in reserve, from civil ranks, with France a close second.

The United States has twice as many civil planes as all the others combined, and has more civilian pilots than all the six other leading nations combined. It is significant of this expansion in civil and military aviation that the United States has more national wealth to defend than Germany, Italy, Japan, and Soviet Russia combined.

Per capita expenditures or subsidies for aviation vary with populations. Great Britain, with the fourth largest number of fighting planes, active and in reserve, spends \$1.68 per capita; Italy, 79 cents per capita; the United States, 69 cents per capita; France, 65 cents per capita; Soviet Russia, 59 cents per capita; Japan, 37 cents; and Germany, 16 cents per capita. (This does not include the pay of the air forces. "In the United States the average person buys his air defense every twelve months for the price of one admission to a motion picture theatre.")⁵

The form of organization of military aviation varies according to the needs of the various countries. In Great Britain and Italy there are unified services. The British Royal Air Force includes military and naval aviation, with close

⁵ From *Comparative Air Armaments of the World* by Carl Byoir and associates.

supervision over and connection with British commercial aviation. The Regia Aëronautica, or Royal Italian Air Force, has also a unified set-up by royal decree of 1925, under the control of a cabinet minister of the air. Subdivisions under this unified head include the Independent Air Force, Army Air Force, Naval Air Force, and Colonial Army Air Force. In France, although unified under the direction of the Air Minister, there are Directorates of Civil Aviation and of Army Air Services, a Department of Naval Air Forces, and a Central Air Department for the Colonies.

The United States has three distinct, independent branches: an Army Air Corps and a Naval Air Service, with mail and commercial flying coming under the Department of Commerce and the Post Office Department. This is changing.

The answer to those who say that there is no aërial menace is found in these facts on the preparation for aërial war. This table of national expenditures for aviation, which have taken a steady upward turn since 1924, corroborates our thesis.

Expenditures and Appropriations for Military Aviation since the World War

For the six years prior to 1930 the increase in expenditures for military aviation of the four leading powers is shown to be as follows:

⁶ Year	Great Britain	United States	France	Italy
1924	\$70,372,000	\$24,689,000	\$16,225,440	\$24,221,421
1925	74,902,800	30,429,000	16,014,142	27,898,000
1926	74,232,820	32,316,000	15,175,115	35,782,421
1927	74,951,000	41,438,000	27,817,717	32,884,874
1928	78,325,000 *	57,886,000 *	31,679,623	32,342,632
1929	78,084,000	63,711,000 *	36,981,985 *	36,610,000
1932	\$98,500,000	\$109,066,000	\$83,600,000	\$50,000,000

* Estimated.

⁶ From Colegrove, *International Control of Aviation*, p. 126 (compiled from various official sources).

In order to have any adequate idea of the importance being attached by all countries to military aviation, there can be no more clarifying factor than a dispassionate set of figures. For the year 1932, then, the countries interested in developing the air arm of their war equipment went about it as follows, and the following table contains the whole story of military aviation.

However it should be born in mind, when looking over this table, that there are many intangible elements in a nation's air strength which cannot be listed in tables but which are equally important. For example, prepared and emergency landing fields, prepared and emergency air pilots, actual number of airplane factories, actual number and types of allied industrial units which could be converted into airplane manufacturing units on short notice, the rate at which industry as a whole could be expanded to meet this strain, the secret inventions ready for use to increase the range and effectiveness of military bombardment. Clearly, air strength cannot be definitely gauged by tabulated methods. Hence, its increasing menace.

APPROPRIATIONS, PERSONNEL, AND AIRCRAFT
FOR MILITARY AVIATION⁷

	<i>Total appropriation in thousands of dollars aviation</i>	<i>Per cent of total defense appropriation</i>	<i>Total person- nel (officers & enlisted men)</i>	<i>Total military aircraft</i>
North America				
Canada	3,409	17.7	450	166
United States	109,066	15.2	27,300	2,566
South America				
Argentina	3,804	—	946	82
Europe				
Belgium	—	—	2,840	308
Czechoslovakia	—	—	6,482	687
Denmark	756	6.3	237	78
Esthonia	—	—	467	74
Finland	750	—	1,910	—
France	83,600	15.5	39,287	4,675

⁷ From *Aviation*, March, 1932.

APPROPRIATIONS, PERSONNEL, AND AIRCRAFT
FOR MILITARY AVIATION (*Continued*)

	<i>Total appropriation in thousands of dollars aviation</i>	<i>Per cent of total defense appropriation</i>	<i>Total person- nel (officers & enlisted men)</i>	<i>Total military aircraft</i>
Great Britain (Inc. India)	98,500	17.8	32,220	2,540
Greece	—	—	2,379	160
Italy	50,000	15.1	23,404	1,600
Irish Free State	380	6.2	163	24
Jugoslavia	4,160	11.0	10,810	924
Latvia	—	—	550	79
Lithuania	386	6.8	729	—
Netherlands	4,500	6.4	1,497	321
Norway	1,170	9.5	360	140
Poland	8,750	9.2	7,919	700
Portugal	483	3.3	997	153
Roumania	8,850	14.6	11,836	799
Spain	4,000	—	5,389	650
Sweden	2,450	7.0	991	167
Switzerland	1,320	6.1	258	300
U.S.S.R.*	20,000	—	19,550	2,000
Asia				
Siam	2,100	17.7	2,486	344
Japan	36,400	—	14,308	1,350
Africa				
Egypt	243	5.1	—	5
South African Union	658	15.5	305	66
Oceania				
Australia	2,600	11.3	915	72
Dutch East Indies	776	—	—	77

* Figures are for 1930 and 1931, and are based on an assumed purchasing power value of 11 cents per ruble.

These figures are startling for many reasons, a few of which should be here analyzed.

Estimating the Military Air Strength of a Nation

Note, for instance, how both large and small countries are developing their national military aviation. Add to these military planes the number of commercial planes controlled by each nation through its subsidized commercial air lines, and then add the possible monthly output of airplanes when a war emergency demands the real test, and the following figures stand forth for the major nations:

	Military Planes	Civil and Commercial Planes	Total	Potential monthly output six months after outbreak of hostilities (very conservative estimates)	
⁸ United States	2,566	10,780	13,346	2,000 *	1,200 †
Great Britain (incl. India)	2,540	1,024	3,564	3,500	1,500
France	4,675	1,500	6,175	2,700	1,500
Germany	—	1,067	1,067	2,000	800
Russia	2,000	?	?	?	?
Italy	1,600	684	2,284	300	800
Japan	1,350	92	1,442	60	500

* Figures given by Brigadier General Drum in 1925 at hearings of the President's Aircraft Board.

† Estimates of Edward P. Warner, Editor of *Aviation*, in 1933.

The total number of the world's military planes (excluding training machines) is approximately 18,000, including these 14,731 of the major nations. The above figures give as nearly as possible the air potential of each country. The annual total defense appropriation for military aviation is about \$420,000,000, out of a grand total for all countries of about \$500,000,000. Then, too, the military reserve—civil and commercial planes and routes—are of great importance. No estimate of a nation's air strength can be adequately made without a careful survey of civil and commercial aviation—the all-important air reserve.

The following facts on civil air routes, government-inspired and government-supported, will give some idea of the process of disunified but strategic expansion in which civil aviation found itself in 1932. The British Empire, including Great Britain and the Dominions, an economic as well as a political unit, has thirty-five air routes in operation, covering 22,297 miles of airways, domestic and foreign. France has twenty-three air routes, covering 19,750 miles of airways. Germany has seventy-one air routes, with 20,272 miles of airways. Italy has twenty-nine routes, with 8,380 miles covered. Japan has five air routes, with 2,426 miles, but

⁸ Figures for this table were published in *Aviation*, March, 1932, with the exception of the last two columns.

is rapidly expanding her air equipment, both commercially and in connection with her army and navy. Soviet Russia has thirty-three air routes, with 19,002 air miles. The United States has 126 air routes, and the largest mileage of airways, domestic and foreign, of all countries—49,254. These routes are ever ready, by planning, construction, lighting, civil personnel with military training, and aircraft for rapid transport, for military defense in case of war, as well as for attack demands wherever and whenever the call comes.

The adaptability of civil planes to military uses is brought out clearly in a statement of Brigadier General P. R. C. Groves, in the League of Nations publication, "The Relation Between Civil and Military Aviation":

"Civil aviation is very readily convertible to war purposes, and no means can be devised to prevent such convertibility which would not, at the same time, prejudice the development of civil air transport."

The tendency of the human being to divert useful and helpful forces to destructive means was feared in the case of aircraft by Horace Walpole, who closed a letter written in December, 1783, to Sir Horace Mann with these words:

"Well! I hope these new mechanic meteors will prove only playthings for the learned and idle, and not be converted into new engines of destruction to the human race, as is too often the case of refinements or discoveries in science. The wicked wit of man always studies to apply the result of talents to enslaving, destroying, or cheating his fellow creatures. Could we reach the moon, we should think of reducing it to a province of some European Kingdom."

Shortened Flying Time between Countries Means Helpless Aërial Defense

Flying time between main cities in the world is being constantly shortened over these routes by increasing speed in engine performance, increasing efficiency in airplane struc-

ture, and increasing development of landing field technique. If any European nations wants aërial war as a means of settlement of international disputes, let the statesmen who cannot or will not agree remember these few figures. If any restless nation has a desire to spill over its borders into a neighboring state, if recourse to war as a means of settling disputes between nations is still favored—study the following figures.

Fast Flying Time

From London to Paris, or vice versa	72	minutes
From Paris to Rome, " " "	4	hours
From Paris to Berlin, " " "	3	hours
From London to Rome, " " "	4½	hours
From Rome to Vienna, " " " via Venice	5½	hours
From London to Amsterdam, or v.v.,	2¼	hours
From Moscow to London, or v.v., via Paris	11	hours
From Berlin to Moscow, or vice versa	7	hours
From Berlin to Warsaw, " " " (via Danzig	4	hours, 40 min.
(via Breslau	4½	hours

No anti-aircraft defense can be prepared on such short notice—no defense, no matter how carefully prepared, can be started on such a narrow margin. This incredibly short time element, growing shorter, marks the main difference between aërial warfare today and what it was during the war. These flying-time schedules are being constantly shortened as engine performance improves, so that the military argument that civilian protection against aërial raids can be furnished completely collapses. No form of military development can protect the civilian population against such an aërial menace at such short notice. Fast-flying unknown airplanes, dropping leaflets of propaganda, gave Berlin an air scare. The actual facts as to the aërial menace would stop danger-provoking political moves.

European capitals and industrial centers are directly exposed on every side to attack from the air. Every city in

Great Britain, as well as on the continent, is unprotectable. Since the flight of General Balbo and his eight squadrons of bombing planes, totalling twenty-four planes, has proven that military trans-oceanic flight is possible, the probable consequences of such flights in war time are applicable to the situation in the United States,—certainly to the crowded eastern cities. Each summer will see an extension of these transoceanic aerial military and commercial flights, so that within a few years this aerial menace will be as applicable to the United States and her southern neighbors as it is to Europe today. This does not imply, either for Europe or for the United States, the answer of more bombing planes, supposedly for greater protection from such aerial hazards. Continued competition in aircraft extends the intensity, radius, scope, and destructiveness of modern war. It does demand direct action for international coöperation and conciliation if the once isolated western hemisphere, now irrevocably bound up with Europe, wishes, with European states, to survive. This is the only alternative to the constant threat of aerial combat, bringing destruction and death to the crowded centers of civilization.

Here is fast flying time across seas:

From Tokyo to San Francisco (Graf Zeppelin)	66	hours
From Paris to New York	37	hours
From New York to Turkey	49	hours
From Siberia to Alaska	16 $\frac{3}{4}$	hours
From Africa to Brazil	17	hours
From N. Y. to N. Y., around the world	7	days, 18 hours, 49 minutes

As a further aid to transatlantic flying, tentative plans are now going forward for a chain of eight man-made islands, or seadromes, which have been invented as stops not more than 400 miles apart, along the course of the Gulf Stream and across the Atlantic Ocean. The locations chosen have

a minimum record of fog, and experiments with models seem to indicate that the seadrome would ride unmoved in a sea with forty-foot waves, while a liner the size of the *Majestic* would pitch and toss.

As the plan now stands, the first three of the islands would be owned by American interests, beginning on this side of the Atlantic and counting east, the fourth by Canada, the fifth by Italy, the sixth by Germany, the seventh by France, and the eighth by Great Britain—a truly international undertaking, indicating graphically how aviation has changed our world. The British navy man who has been chosen as meteorological expert for this chain estimated that the entire chain would represent a total investment of about \$30,000,000, or less than the cost of a single modern super-liner, while he believed that at least ten times the number of passengers could be transported in a year between the United States and Europe by means of planes using the seadrome than could be carried in a single year by such a steamship. It is hoped to establish a thoroughly modern, fully equipped hotel on each seadrome, with accommodations for a hundred guests overnight or four hundred in the daytime. Special planes have been designed which would have Pullman berths for those wanting to make business trips on which they could sleep en route. Another design has a detachable cabin which may be used as a seaworthy power boat in case a forced landing should be necessary in an emergency. If this plan should not mature, nevertheless aërial stages *via* Labrador, Greenland, and Iceland, are being mapped by Colonel and Mrs. Lindbergh as this book is being written. Colonel Lindbergh stands in his words and acts for constructive aviation, and typifies the aërial spirit of good-will between nations. Hence his increasing popularity.

The development of aërial speed and radius in trans-oceanic flying is less marked than in continental aviation,

but here the progress for the future will be more striking. Not a summer passes but new records are made by intrepid flyers, spanning the oceans in all directions. The American inventor of the seadrome and his associates, when conditions permit the placing of the large floating platforms, will have carried ocean travel so far forward that our fast steamers of today may soon seem slow and antiquated. In Appendix IV a list of the peace-time uses of aviation will be found, showing the constant development in all spheres of human interest, constantly encouraging new development in military aviation.

The significance to all nations of these improvements in commercial and military aviation is obvious. With such large expenditures, there have been considerable developments in new types of bombing, pursuit, and other types of military planes. Evidence of the degree of development of engines of aerial terror is to be found in an article in *The New York Times* of April 16, 1933, by Lauren D. Lyman.⁹

In support of his idea that new construction will mean changes in tactics, Mr. Lyman quotes an editor of an aerial magazine who was formerly chief of the Air Corps, Major General Fechet. The latter authority mentions bombers with a rate of speed of 200 miles an hour or more which are now being developed. He recognizes that the speed of pursuit planes will also be increased.

⁹ "Pursuit aviation in the Army Air Corps is undergoing another change. The advent of bombers with nearly double the speed of the bombing planes that were standard two or three years ago has placed the emphasis on speed as never before. Furthermore, the designers and manufacturers are not only being required to deliver faster planes, but they must supply planes that can hold their speeds at extremely high altitudes.

"It is now part of routine training for pursuit squadrons to go through their evolutions at 30,000 feet. The pilots, protected by face masks as well as goggles and warmly lined helmets against the extreme cold, must carry oxygen tanks, weighty apparatus which cuts down the climb and consequent efficiency of their machines.

"All this means more powerful engines, built to deliver power at temperature extremes, equipped with superchargers able to create surface atmospheric pressure at altitudes of six miles."

Lyman continues with regard to pursuit planes:

"Highly manœuvrable, stronger for their size than any other airplanes built, able to dive at better than 400 miles an hour and then to terminate that dive abruptly and pull up into a climb of miles without losing their wings, (they) must protect the other arms of their own air force and enable them to operate without severe loss. At the same time they must make it impossible for the enemy air forces to operate except with disastrous results."

The writer then goes on to tell how both sides in the World War used pursuit planes out of their usual rôle in aerial warfare, in connection with ground attacks, or to attack troops marching up to the lines. He records that the moral effect was greater than the actual damage done. He goes on to say:

"Since the war the Air Corps has sought to develop special planes for this attack duty: powerful, fast, low-flying machines of great manœuvrability, heavily armed and able to give and take a beating both from the elements and the enemy.

"The creation of the attack wing increased the divisions of our fighting forces to four: pursuit, attack, bombing and observation. The pursuit, in addition to its offensive duties, must act as the protector of the other three in carrying out their operation."

Mr. Lyman tells of continued experimenting to develop planes for all conceivable war uses and of maximum capacity for defense and attack. If such development in war planes and the practice of indiscriminate bombing continues (there is no sign of a let-up), then all property and all people within any battle area are subject to attack.¹⁰

¹⁰ On the subject of vulnerable points susceptible to attack in a country's manufacturing centers, J. M. Spaight says:

"Unquestionably the large metal works, the large fuel installations and all the factories whose products go to the equipping of armed forces with 'moving power' and 'blasting power' will be objectives of air attack in a future war. It is idle to place a ban on such attack. The military reasons for it are overwhelming. Of the two 'battle fields' which it is necessary to envisage today—the field of actual encounter in arms and the field in which the instruments for that encounter are created—the second has become the more vital point of the two. Because that is so there should be in a doctrine of war whose principle is the destruction at the 'source' of that material constituent nothing to which the orthodox school of military thought can take exception."

Air Power and the Cities, pp. 145-146.

When it comes to the greater vulnerability of those who are working on the actual making of munitions and other military supplies, Spaight says:

"The change, which is the natural result of the penetrative quality of bombing aircraft, involves acceptance of the proposition, for the first, that military overthrow, in so far as it is a matter of the destruction of the material element of war strength, can be accomplished as effectively in the area of war supplies as in the area of battle; for the second, that demoralization of munitions and allied workers is the surest avenue to general demoralization, which is his aim. For the jurist it involves the admission that such workers must be admitted to the combatant class rather than to the noncombatant class of the population of the enemy country. To none of these views should there be any insuperable objection of principle. They are a part of a consequence of the general revalorization of both strategic and juristic thought currents necessitated by the mechanization of war and the coming of air power."¹¹

This author sums up what he considers the work of air forces to be in war: first, destruction of an enemy's fighting power and materials, and, second, the breaking of the morale of the enemy to the point of surrender. Indeed, he so conceives of the strength of air forces (apparently with one side much stronger in that respect than their enemies) that he calls air power "the great potential disarmers, the great potential war-breakers." He grows romantic in considering the matter and calls the air branch in time of war "not the villain of the piece, which it is sometimes thought to be, but the hero, the knight errant, the servant and friend of the crusaders against war." He seems to think that military aviation can be a war-preventing force, presumably by so quickly throttling an enemy's munitions works and chemical factories that the enemy would speedily surrender. This is, to those who are working for peace through goodwill and by the substitution of the authority of conciliation and arbitration

¹¹ Spaight, *Air Power and the Cities*, p. 161.

for that of force and intimidation, to say the least, a most curious form of "disarmament" and "prevention of war." How a nation thus summarily subdued would wish to do anything but retaliate by building up its own air arm for a future "come-back" it is very difficult to see.

The strategy of air war is quite different from what this idea of Spaight would lead one to suppose. The truth holds good in this branch: the best defense is the best offense. But in the twenty-eight comparatively small European countries, this axiom leads their respective air forces into each other's territory. In other words, those aviators wanting to defend their own country are forced to go into the enemy country. The battlefield is the nation. As M. de Brouckere, the Belgian delegate in the Air Commission of the Disarmament Conference, said, when the necessity for keeping aërial bombing and warfare within certain industrial zones and battlefields was being discussed:

"That theory is all right unless you happen to come from a country that is just the size of a battlefield."

Aërial strategy then divides itself into air combat for one group of planes, fighters and attacking planes and pursuits, while the bombing squadrons, escaping this air combat and escaping each other, make for the enemy territory to bomb and destroy while the defending force is engaged with a section of the invaders. No laws can restrain such aërial combat.

This is not the kind of warfare which military leaders or the manuals approve. It must be clearly understood that unrestricted bombing is far from the thoughts of those in command of the forces, either on land, on sea, or in the air. Generals and admirals and flight leaders want to gain their objectives with the least amount of slaughter. That is military science. However, when modern war has once started,

with its surprise attacks on every weak side, the population, feeling itself insecure from the aërial menace, will demand reprisals just as, during the World War, as soon as London or Amiens was bombed, the Allies in reprisal bombed Carlsruhe and the Rhine towns. Reprisals, continuing and becoming intensified with the increase in insecurity and casualties, soon get out of hand, and aërial war escapes the control of the strategists, to develop into a race of quick, successive gas and explosive attacks, aimed at the heart of the enemy nation. Both sides indulge because the infuriated population demands safety, and both sides, calling on their last ounce of reserve, fight to a desperate finish.

What finish? What is settled by this method? Certainly this is no way of settling disputes between nations. "Let the best man and the best nation win," is an adage that no longer fits society. Today it is the best poison gas, the best air fleet, the first attack. The finest men, our aviators, are wiped out, the unfit live on. This is no solution for society. We must face the problems which such enforced international co-operation, if you will, brings upon us. Aviation decides between a constructive society and lasting hate and destruction.

We now have a fairly good idea, from the development of both military and civil aviation, of what we might expect the air arm to do in another great war between nations with highly developed aviation.

Aërial interests are guarded, developed, and enlarged by the direct activity of governments. With the constant expansion of military aviation, ceaseless competition, increasing suspicion and confusion are all too evident. Out of this transition stage must come some semblance of international order. Because the safety and therefore the interest of the non-combatant are directly involved, no longer is it a question for governments alone.

The new battle cry for aviation shall be, "What a grand transport that bomber would make!" This is not impossible from any technical angle. It must be kept in mind that, after the World War, the bombers were all converted into transports which, on the French aërial lines, were running as late as 1926, when a new aërial program for war purposes and a separate one for commercial reserve aviation was developed. This interchangeability from bomber into transport and transport into bomber is controlled and directed by government policies for peace or war.

Naval aviation, begun before the war to a slight degree (in Great Britain especially), was developed in technique and expanded during and since the war.

In naval aviation there are really only three major nations interested,—the three having the most powerful navies: Great Britain, the United States, and Japan. Of these three the United States has the largest and most powerful bombing planes. Due largely to the enthusiasm, vigor, and insistence of Admiral Moffet (who died in the Akron disaster), the emphasis in American naval circles on naval aviation has been steady and productive of remarkable results for the eight years of its expansion.

In the course of the World War naval aviation was in its primitive stage. It was used in sending planes as "spotters" for the bombardment of ships or shore batteries, and planes from ships were used for patrol duty, calling the attention of surface warships to the presence and location of submarines. Seven of the 199 German submarines lost during the war were actually sunk by naval aircraft. Torpedoes released from hydroplanes were experimented with during the war, even employed a few times, but not sufficiently to become a factor of any importance. In other words, naval aviation and its rôle in warfare could not be fully developed in the midst of the conflict, although it is interesting to note in passing

that the British Grand Fleet carried seventy airplanes as a part of the battle equipment in the closing stages of the war.

Since the war there has been a definite change. Aircraft carriers—vessels fitted with landing and flying-off decks—have been built so that now Great Britain has six such ships; the United States, three, with one more being built; Japan, four; France, one. These aircraft carriers are a very significant development in aviation for three good reasons. First, they can house (according to their size and construction) from twenty bombing planes up, and transport them and their pilots and mechanics along with the fleet to any part of the seven seas, dependent only on friendly fueling stations and sufficient convoy. Secondly, they are therefore greatly feared by such island nations as Japan, for they represent the only menace at which Japan is really terrified—the possible bombing of her many crowded cities made of flimsy wooden houses, with incendiary bombs and high explosives. This aerial bombing, as both Japan and Great Britain know well, is the only form of warfare by which an island nation is directly open to attack, and against which, according to present tactics, the only protection seems to be more planes and more poison gas,—which are the very things in which these nations are specializing. Thirdly, to protect these airplane carriers, more battleships must be built, with more heavily steel-enforced decks and hulls against bombs and torpedoes.

So the race goes merrily on—more airplane carriers to attack overseas countries, more battleships and larger to protect the airplane carriers, more planes and more new bombing stunts to make the whole process more worth while. My admiration for the ingenuity displayed in the latest airplane carriers is unbounded—from the point of view of

human control over machines. The automatic stop for these deadly bombers and pursuit planes as they settle at full speed on the narrow deck of the carrier never fails to arouse admiration.

The question arises, however: Where is the end to all this competition in aircraft carriers and naval bombers (which has hardly been checked by the Washington and London naval treaties)? If larger and stronger battleships are needed to protect the carriers (incidentally, Japan has insisted upon serving notice that the London naval ratios must be changed in 1935 to permit her to enlarge her quota), they are that much better targets for enemy naval bombing attacks. If more cruisers are needed to protect the monstrous-sized battleships and more submarines and patrol boats are then necessary to protect the cruisers which are protecting the battleships which are such easy targets for aerial bombs or torpedoes, where is the beginning and end of the circle of ceaseless naval building and the development of more intensive fighting units?

Obviously the key to the maze lies in naval aviation. Today the battleship carries its own landing deck for planes, which are catapulted into the air; the cruiser carries its own plane (even though only twenty-five per cent of the cruisers are permitted by the London Treaty to be so equipped), and I have seen pictures of fast submarines thus equipped. The plane is the eye of the fleet and the menace to the battleship, bombing it with explosives or spraying it with mustard gas or some other lethal gas which sucked into the ventilation system, makes the ship a floating hell. American naval bombing pilots, called "hell divers," swoop down on a target at the rate of almost five hundred miles an hour. No anti-aircraft gun can be focussed quickly enough to touch them, no other airman can catch them. By their increasing perfec-

tion they have sealed the doom of the large battleship. Once this is understood by the people and admitted by the naval experts, the key to naval disarmament, through the elimination of naval bombers and of large battleships, opens an easy path to drastic curtailment of expenditures on navies and a thoroughgoing revision of the outmoded idea of security, based on expanding navies.

In this year—1933—the United States has in its naval aviation section one thousands planes, including fighting, observation, torpedo, patrol, transport, and training planes; and in the enlisted personnel, including officers, marine corps aviators, and enlisted men, 13,423, while the personnel of the naval reserve aëronautical forces totals 1,572. This is now being increased.

Great Britain has in her naval aviation a more complicated situation and alignment, for there are Royal Air Force squadrons protecting overseas colonies, mandates, dominions, and islands. However, those planes stationed with the Grand Fleet are increasing in number as aircraft carriers and landing decks on warships and cruisers increase.

The Japanese naval air force comprises 108 shore-based fighting aircraft and 202 planes either on fighting ships or plane carriers, making a total of 310 naval planes. Obviously the combination of American and British naval fighting units could easily bring Japan to terms in the Far East.

Naval aviation cannot win a battle single-handed. Other means of convoy are needed for support. But, as the radius of flight of shore-based bombing planes increases (the Balbo flight of Savoia-Marchetti boats with Isotta-Fraschini engines marks an era in this field), such bulky impedimenta in connection with naval aviation as carriers and battleships can be dispensed with. The degree of possible and probable reduction of navies in view of these facts will be discussed at the end of Part II.

Propaganda for Air War

There is one aspect of naval aviation which, although inherent in the war machine, needs to be discussed. That is the part which paid propaganda plays in increasing distrust and fear between competing nations. Connected with each government army and navy headquarters in each large country is a bureau, called by a different name in every language, with sometimes varying functions from one country to the next, but whose fundamental purpose is the dissemination by word, written or spoken, by pictures and moving pictures, by every means available to the publicity expert, of a message of national preparedness and of national supremacy over other nations in the race for preparedness. Often maliciously distorted, the facts are bad enough in themselves. A sample incident from my own country proves the case.

An excellent moving picture, with sufficient story to make it palatable to the public, released by the propaganda department of the American Navy, was entitled "Hell Divers." It showed only the thrills connected with naval aviation and the power of the navy to mobilize its aërial strength against a possible enemy. The proper proportion of pretty girls, dress parades, discipline, and the thrill of foreign countries was most adroitly handled to lure the American male. However, this same picture, retitled "The Bombing Squadron of the Pacific," was sent over to Japan and there the naval and military officials required the attendance of their junior officers to see the probable menace from the western hemisphere. The fear and distrust which that picture engendered against the United States at a crucial time in the political scene in Japan has lasted too long. This, of course, is only one incident in the long list of innumerable efforts which each nation is putting forth and which must be stopped.

Here is the growing work for moral disarmament, chal-

lenging the best thoughts and efforts of those pioneers who seek new fields to conquer. For each powerful nation is doing likewise. In Germany, there is a veritable mania for moving pictures showing the air war of the future. Exhibitions on the coming war are to be found on the main streets of her large cities. France, Italy, Russia, all of them are bending energy to the portray through the press, the moving picture, through pamphlets and books, through the spoken word and personal contacts, of the air war that is coming. Only the glories of such a war are portrayed—none of the realities. This inspired propaganda breeds hatred and fear—thus directly adding to the armaments burden.

Summary and Conclusions

From the very beginning of its practical application, aëronautics was applied to purposes of war. Rules governing air war, drawn up before the World War, showed plainly, first, that air war was feared even before its actual use and secondly, that no rules governing the conduct of airplanes, their methods and zones of attack could be obeyed when war was actually declared and the survival of the fittest was the order of the day. Also, even during these early days, the danger to the non-combatant from unrestrictable aërial bombing was and is wiping out the distinction between combatants and non-combatants which had been built up during the preceding centuries of warfare. Reprisals, night attacks, increasing radius, increasing speed and increasing bomb load of bombing planes has completely obliterated any hope that the non-combatant will be spared. Therefore, each nation is concentrating on its military aviation, both military and naval, as an answer to the plea of self-defense. Appropriations are mounting yearly, emphasis is swinging yearly to the increasing importance of the military air arm. The air strength of a nation based on the military and commercial aviation

shows a consistent yearly increase. This emphasis on the unceasing development of airplane performance shortens the flying time between nations and thus makes more improbable with each passing year, any adequate protection for the civilians in the crowded cities. Actually, adequate defense against aërial bombing attacks for the crowded sections is even now very much questioned. New types, new materials, new improvements in engine performance show the keen competition between nations in aërial development and reveal the growing fear of such uncontrolled military air expansion on the part of all nations. Naval aviation is developing at a similarly rapid pace, and the boast of the great naval powers that their naval aviation is second to none, is leading to a growth in naval strength out of all proportion to the actual needs of defense. Curtailing naval aviation is the key to the curtailment of naval expansion. Propaganda for this expansion is well developed in all countries, adding to the fear already intensified.

Conclusion—Such competition in military and naval aviation is increasing the tension between nations (already at the breaking point) and the fear which infuriates the populace. Bombing planes, pursuit and fighters are marking a new era in war preparation which directly involves the lives and the interest of the non-combatant. Even if these military planes were all wiped out, commercial aviation readily and easily convertible into war planes would remain as a constant menace. Military aviation is based on national and international competition in performance, a competition as keen if not more keen than in land armaments. That is the challenge to us.

CHAPTER IV

WHAT PROTECTION IS THERE FOR US— THE NON-COMBATANTS?

AGAINST the menace of indiscriminate aërial bombing there are four possible forms of protection for the non-combatant: first, aërial disarmament; second, international rules regulating bombing from the air; third, the internationalization of civil aviation; and, fourth, an all-inclusive world organization. No one of these methods alone is sufficiently powerful to be relied on solely, for no one alone can be accomplished without all the other three. Such a close integration is imperative if some measure of control over aërial bombing is to be achieved.

Aërial disarmament is a very complicated problem, for, in the process of disarming military and naval aviation, civil aviation (because of its quick and easy convertibility to war uses) becomes more important. Hence an ever-increasing number of countries desire to own and control their own civil and commercial air lines and aircraft. Then, too, although the abolition of all bombing from the air except for police purposes in certain outlying regions (as the British text has it) can be readily accomplished by unanimous agreement, it should nevertheless be kept clearly in mind that such abolition puts a premium on other methods of destruction. Such abolition, however, entails the reduction and eventual elimination of military and naval bombers and therefore should be urged and achieved.

The Difficulty of Defining a Bombing Plane

It must be remembered that one does not have to bomb from the air for the dispersal of some poison gases or bacteriological germs. Spraying with mustard gas is not bombing, but almost as effective. There is always a means of getting around definitions, although crystallization of a process into a definition for prohibition is a step forward. Yet definitions are susceptible to tricks of verbal gymnastics, and their legal interpretations are subject to distortion, for all words can mean all things to all people. For instance, the Air Commission of the Disarmament Conference spent weeks, running into months, trying to define a bombing plane. After involved discussions in which they tried vainly to balance in proper proportion for each country the three outstanding characteristics of the bombing plane,—namely, the unladen weight, limitation of horsepower, and ratio of horsepower to wing area, the delegates who were members of the Air Commission almost gave up the task as hopeless. If, they reasoned, the unladen weight of a large plane were to be limited by treaty, then horsepower and wing area could be increased, giving increased radius of action; if either one of the two other factors were to be limited, the remaining two could be increased.

So the discussion ran on for weeks, for wing area had likewise to be defined, and then the varying horsepower of airplane engines with varying altitudes had to be adjusted. The upshot of it all was that no definition of a bombing plane could be found which would meet all objections. In the British draft the final criterion is based on unladen weight. One realizes, however, as one reads the qualifications for unladen weight, that any large tri-motor commercial plane is a potential bomber, and is not limited or reduced in size by any international agreement, being subject only to that

supreme test in industry: does it pay? The elaborate examination to which the Permanent Disarmament Commission must subject the bombing planes of all nations includes not only as close a check-up as is humanly possible as to actual numbers of bombers, but also each examined plane must be reported on (according to Article 37 of Chapter III, Air Armaments, British Draft) as follows: ¹

"The High Contracting Parties agree that their air armaments will not include armaments exceeding three tons unladen weight. Exception, however, may be made in the case of troop carriers and flying boats. Complete particulars of any such machines exceeding the maximum unladen weight of three tons must be returned annually to the Permanent Disarmament Commission."

Here is a clear-cut example of the interminable difficulty of relying on definitions to limit or reduce armaments. If bombing planes are permitted to the nations by this First Disarmament Conference, then the principle of allowing bombing from the air, through stretching the permitted exceptions to cover the *fait accompli*, is legal. Aërial disarmament, to be effective, must go farther than that. How far we shall decide at the end of this section, after discussing other important factors to be considered before reaching definite conclusions.

Throughout this continued exploring of the possible protection afforded by aërial disarmament and international agreements, one thought should be held steadily in the mind of the reader: What about the uncontrollable development of civil aviation for possible military use? That is the final test for aërial disarmament.

Easy Convertibility of Civilian Planes into Military Planes

The close connection between civil and possible military uses of civilian planes is demonstrated by the fact that, although Germany has been disarmed of all military aircraft,

¹ See Appendix III for definition of unladen weight of a bombing plane.

France feels no added security in view of the rapid development of Germany's commercial aviation. So French theses for internationalization are predicated on the twin basis of, first, the gradual elimination of all military planes, and, second, the control by the Council of the League of Nations of long-distance aerial lines. The registration and attendant publicity of all planes,—private, commercial, mail, etc., over a certain size by League authorities is also desired.

As we have noted, civilian and commercial flying is supported and encouraged by the state for military convertibility. This means that any kind of plane can be and will be used for some form of military use if war should come to the aerially minded nations.

Attempts to distinguish between civil and military aviation have prevented any progress in air disarmament. The Washington Conference of 1922 established a sub-committee on aircraft. In explanation of their decision that it was not then practical to impose any effective limitation upon the number and characteristics of aircraft, either commercial or military, they reported:

"There is one insuperable objection that is common to every method, namely the close relationship which exists between civil and commercial aviation and air power."

The committee of air experts which met at Brussels in February, 1927, came to this conclusion,

"Every effort should be directed towards differentiating more and more clearly between civil and military aviation; in this way civil machines will become capable of a maximum economic return and will become less and less useful for military purposes."

Nevertheless Brigadier General Groves, in his report to the League of Nations, challenges this Brussels memorandum by remarking that the large air-liners, as they continue to develop, are becoming more and more efficient as potential long-range night bombers. His solution of the difficult

problem of distinguishing between civil and military aircraft, and so of limiting the latter while the former goes ahead, is to include the large air-liners as second class bombers, thus making possible a reduction in the number of first class, or purely military bombers.

Common sense, however, immediately tells one that such a move merely intensifies the race between competing nations, already strenuous enough, for the development of larger air-liners. This conclusion is corroborated by the statement of the air committee of the Preparatory Commission for the present Disarmament Conference, which for six years tried gradually to evolve a distinction between civil and military aircraft. In the meetings of that committee, delegates of two of the nations having particularly well developed civil aviation—the United States and Germany—declared that, "In order to be efficient in practice, any method must provide for the limitation of civil and military aviation as a whole; the limitation of military aviation would be ineffectual, for it would be balanced by a corresponding expansion of civil aviation." The present first Disarmament Conference has battled through this thorny question of how to limit and reduce both civil and military aviation and has reached no agreed conclusion. No satisfactory conclusion can be reached until that most important of all factors in the continuing development of aviation is frankly discussed and a constructive solution satisfactory to all concerned is evolved—an effective world organization.

Short History of Unsuccessful Attempts to Limit Air Armament

Up to the present some attempts have been made to limit air armaments. Briefly, the only successful limitation and reduction of air armaments which have been carried out as

yet are those which the victorious Allied powers imposed upon Germany, Austria, Hungary, and Bulgaria in the Peace Treaties, respectively, of Versailles (Articles 198–202; 210; 313–320), St. Germain (Articles 144–148; 276–283), Trianon (Articles 100, 128–132, 139, 260–267), and Neuilly (Articles 89–93, 204–211). In these aerial disarmament clauses all military and naval aviation was forbidden and the manufacture and importation of any kind of aircraft for a period of six months after the signing of the treaty was forbidden. Under the nine rules drawn up on request by the Aeronautical Advisory Commission for the Supreme Council, a distinction was arbitrarily drawn between civil aviation and military and naval aviation. These rules proved unsatisfactory to the Germans, who claimed that such drastic regulations, entailing unremitting supervision, were strangling commercial aviation. These rules were finally relaxed at the conclusion of the Locarno Treaties.

A review of what has been tried in the attempt to regulate aerial bombardment by international rules is noteworthy as a record of the inconsequential degree of success achieved and the glaring tale of its general failure. At the first Hague Conference in 1899 a proposal, put forth by the Russian delegation and seemingly accepted without much opposition by the delegates, prohibited "the throwing of projectiles or explosives of any kind from balloons or by any similar means." The ease of acceptance was due to the fact that such prohibition dealt with new and untried weapons. In other words, as the American delegate, Captain Crozier, sagely remarked of the progress of the first Hague Conference, "If we examine these decisions, it seems that, when we have not imposed the restriction, it is the 'efficacy' that we have wished to safeguard, even at the risk of increasing suffering, were that indispensable."

At the second Hague Conference in 1907 the delegates

were confronted, not with the impractical balloon, but with the dirigible, a means of warfare already incorporated into the military establishments of two great powers, having proven military capacities and unlimited possibilities for further development. The Russian government had included in the agenda a proposal for the renewal of the balloon prohibition which had expired in 1904. With the development of the rigid, semi-rigid, and non-rigid dirigible by 1907, fear of the air peril had taken root in Europe and has increased and become intensified with each new aërial invention ever since. As defined in 1907, and still valid, the air strength of a nation includes the following: aircraft already incorporated in the military and naval service as well as those under properly trained civil personnel; hangars and airdromes; and allied industries capable of producing aircraft material. Air power on the basis of such air strength consists of "the ability to strike at an enemy's resources, industrial or otherwise, the ability to influence the morale of a nation by striking at the government and the people themselves, in carrying the war to the cities and industrial centers of the enemy country which the army and navy are unable to reach." This definition of Flight-Lieutenant C. J. Mackay appeared in the *Journal* of the Royal United Service Institute in 1922, and is as effective retrospectively as for the present and future.

The second Hague Conference faced an interesting situation in regard to air strength and air power. Germany, France, and Russia (since the disastrous result of the Russo-Japanese War), as well as Italy, were all enlarging their appropriations for the air arm. Air warfare by means of either heavier- or lighter-than-air machines was an established possibility. Therefore, indicative of the tendency of all such international gatherings, the purpose was to continue its possibility while limiting its probability. This is an all-important fact in con-

nection with disarmament conferences in the past.² Here lies the crux of the difficulty of placing responsibility for drawing up disarmament programs in the hands of professional military men.

Before concluding this brief summary of air warfare rules and bombing regulations drawn up before the outbreak of the World War, two important points need special stress. The war right of destruction and devastation is confirmed in the Hague regulations and in the various military manuals as well as being admitted by writers. Hall's statement stands unchallenged as recognized international law for war,

"The amount of destruction or of suffering which may be caused is immaterial if the result obtained is conceived to be proportionate."

Applied to modern warfare we find that the civilian is the sufferer. The aim of this book is to concentrate civilian interest upon the perpetuation of civilization by the total abolition of all war, through the double-edged method of gradual but drastic disarmament, combined with a growth and strengthening of international organization.

Do International Air Rules Protect Us?

Since the World War there have been only a few attempts to date to formulate air rules, and all have been as unsuccessful as the previous attempts.

The permanent administration of the rules of the Air Convention of 1919 (drawn up in connection with the peace treaties) was vested in an International Commission of Aërial Navigation (the most important group on aviation), which has issued some important rulings and which distributes a weekly Bulletin of Information. Much of its

² Royse says, "Aëronautics, in the interval between the two Hague Conferences, had acquired distinct military significance and had found a place in the national defense schemes of these powers, and as such *had taken on the immunity of the other weapons already established.*"

attention is given to such matters as the standardization of requirements for issuing certificates to planes and licenses to pilots, uniformity of maps, adaptation of rules to changing conditions, and study of the Convention to keep it up to date. No effort is made, however, toward a relief from conflicting national rulings and interests. Important disputed judicial issues are under the jurisdiction of the World Court.

Peace treaty arrangements had put Germany under very severe restrictions in the Nine Rules which aimed to prevent manufacturing and importation of aircraft. These were relaxed, and eight rules, aimed only at the prevention of the use of aviation for military purposes, were laid down in 1926 by the Conference of Ambassadors, which carried on responsibility for peace settlements. These, too, were found to be too great an encumbrance to German civil aviation, and so, with the signing of the Locarno Treaties, they were removed.

The most important provisions of these newer rules were: the prohibition of all aircraft equipped in any way for military use; the keeping of detailed lists of registered planes and pilots, even those flying small sporting machines only, to be submitted to the League of Nations and to be officially published; the prohibition of all subsidies to sporting aviation by any governmental division; prohibition of pilotless airplanes; limitation to a very few military and naval men who might engage in sporting aviation—and then at their own expense; restrictions on air traffic and construction of airports in the neutralized zone; prohibition of police aircraft.

The Preparatory Commission for the present Disarmament Conference worked for fully five years on proposals which the Conference might consider. Article 28 of the Draft Convention which embodies their suggestions contains four rules which would place civil aviation on a better plane and which would aim to preserve its non-military character.

The first of these pledges the High Contracting Parties to refrain from prescribing the use of military features in civil aircraft. The second would involve a similar pledge that the Parties should not require civil aviation enterprises to employ personnel specially trained for military purposes. The third would pledge the signatories not to subsidize, directly or indirectly, air lines principally established for military purposes, while according to the fourth they would make every effort to draw up economic agreements between civil aviation undertakings in the various countries.

None of these suggestions have been adopted. Excellent as they are, they do not go far enough, for relentless supervision is implied in the air policy and financial policy of each air-minded nation. This under present circumstances is impossible.

The five nations which participated in the Washington Conference—Great Britain, France, Italy, Japan, and the United States—met with Holland at The Hague from December 11, 1922, to February 19, 1923. The results as far as the adoption of rules to govern aërial bombardment is concerned is practically nil, for these Hague rules are actually interpretations. Hence no nation took the trouble to ratify the convention there drawn up, with the consequence that none are binding on any nation. However, one point incorporated into these rules has led to much discussion and varying interpretation. Article 24 reads:

"1. Aërial bombardment is legitimate only when directed at a military objective, that is to say, an object of which the destruction or injury would constitute a distinct military advantage to the belligerent.

"2. Such bombardment is legitimate only when directed exclusively at the following objectives: military forces; military works; military establishments or depots; factories constituting important and well-known centers engaged in the manufacture of arms, ammunition or distinctively military supplies; lines of communication or transportation used for military purposes.

"3. The bombardment of cities, towns, villages, dwellings or buildings not in the immediate neighborhood of the operation of land forces. In cases where the objectives specified in paragraph two are so situated that they cannot be bombarded without the indiscriminate bombardment of the civilian population, the aircraft must abstain from bombardment.

"4. In the immediate neighborhood of the operations of land forces, the bombardment of cities, towns, villages, dwellings or buildings is legitimate provided that there exists a reasonable presumption that the military concentration is sufficiently important to justify such bombardment, having regard to the danger thus caused to the civilian population.

"5. A belligerent State is liable to pay compensation for injuries to person or to property caused by the violation by any of its officers or forces of the provisions of this article."

Thus there has been established a theory open to such manifold interpretation and misinterpretation that again no two authorities can agree—a perennial state of mind among military authorities. This disagreement opens the way to indiscriminate bombing, for varying interpretations offer the loop-hole for excesses. No rules can hold back aerial bombing when the urgency is great.

What is exactly a permissible objective for military bombardment? The answer to that question ranges the world, but this principle is agreed upon by all: that permissible objectives for military bombardment must be in harmony with military effectiveness. This leaves the non-combatant directly under the wheels and wings of the motorized, mechanized army and air forces, especially open to attack from on high if he happens to live within the limits of the area of battle or in a community considered to be of strategic importance, from a sizable town to a great industrial center.

In a very interesting book, "Warfare of the Air," by the able Italian General Douhet, there is a summary of the fundamental principles of air warfare which holds true for all nations. General Douhet says,

"The only objective of air warfare is to be mistress of the air. As soon as a nation is supreme in the air the aërial forces may be employed to attack surface forces, to break all moral and material resistance of the adversary.

"Disregard any other objective and all precedents, under penalty of giving your adversary the upper hand."

His conclusions are that military and naval warfare will be reserved for defensive operations and that the air arm will be used for offensive. Again that questionable distinction between defensive and offensive warfare appears, to give strength to those who wish to see a substantial increase in armaments. This emphasis on the offensive use of the air arm is maintained in all countries. The very organization of the air service is predicated on such use. The instruction given in government schools of aviation is based on such an assumption. Aviation for combat, whether based on rules or not, is the actual procedure.

So one watches with amazement the infinitesimal steps which have been taken in the past in various conferences to meet the increasingly serious aërial situation and yet invariably that which was feared by those who watched—the effective use of aviation in war—has come to pass with terrible effect. Can the human race muddle through some more infinitesimal steps toward sanity, or is this the last reprieve? Each man's opinion is as good as another's in answer to this question. I feel it is midway between these extremes. Although the international situation is desperate, one can see, in looking back over the last ten years, that distinct progress has been made by the nations toward that political coöperation so essential to individual and national salvation. Progress in disarmament can keep up with the progress in political coöperation only if it moves quickly and more drastically. Here is the challenge of the last reprieve.

To conclude, facing the fact squarely, there is no protec-

tion for the civilian non-combatant against aerial warfare from either aerial disarmament (which is impossible because of the inseparable connection between commercial and military aviation) or from air rules of warfare which aim to regulate the bombing area. Disarmament conferences and committees of jurists, in trying to make war more humane by limitation, have only sanctioned the use in turn of each new weapon of warfare.

*A World Air Force—Internationalization of Civil Aviation—
Will That Help?*

What other hope is there, then, of escaping this menace above our heads; do we find any in the internationalization of civil aviation? What, exactly, is internationalization? No one knows. Everyone has an opinion at variance with the opinions of everyone else. How can internationalization, thus undefined, and at present very difficult to define, be achieved to the best interests of all nations? That, likewise, no one knows, and each person's opinion is at variance with those of others. It must of course be recognized, as indicated in preceding pages, that there are tremendous obstacles to the achievement of internationalized air lines.

The ground can be cleared of some of the outcropping undergrowth of misunderstanding by affirming at the outset that as far as one can see today internationalization of civil aviation can be achieved only under the supervision of a unified, central authority acting in the interests of all nations. Certainly no one nation, even if it were supreme in the air, should dominate the air policies of all nations because of such supremacy. Internationalization of civil aviation, if it is to come (and it must come gradually because of the financial and political commitments of the various nations and commercial air lines originating within national boundaries), should include, as it progresses to its fulfillment,

first, the eventual abolition of all bombing planes, military and naval; second, a central authority to direct the combined air forces of the world and act as an international police force; third, the formation of an international aircraft manufacturing cartel or pool, or some form of amalgamation of various national aircraft companies, united by a close working agreement of types, limitation of production, and the allocation of foreign markets.

Added to these prerequisites, the lack of which today obviously constitute some of the obstacles to internationalization, are such other hindrances as the necessity for the development of an international status for national pilots; the regularization of air codes and rules for civil aviation. There would be knotty problems of administration, from that of the language barrier to the supreme difficulty of deciding to what individual or, better, to what branch of the League of Nations to entrust this supervision. Then there are such positive difficulties as the opposition of powerful countries, with well-established civil aviation, such as Germany and the United States.

We are prone to intensify our American opposition by the oft-heard plea of geographical isolation, with its attendant plea of non-interest in European affairs, political, social, financial, commercial, or aërial. As the first four classifications have proven to have close connections with American national health and well-being, so, too, the last item is proving to have more close and definite connections with every passing year. Such countries as Canada, Argentina, and Japan have joined in this opposition to aërial internationalization, using the American argument of geographical isolation. At the present time this stand of powerful nations is understandable because the political involvements in the success of aërial internationalization are enormous, and, for these nations, at this time, unacceptable.

The opposition of Germany to aërial internationalization is briefly this: her commercial and civil air arm is her only form of defense left, as a result of the Treaty of Versailles. Therefore, unless her security is assured by firmer political guarantees, Germany sees no wisdom in entering her air arm in such a plan for internationalization. Germany's proviso stands thus: to the highly armed powers on the continent (which promised, under the Versailles Treaty, to disarm), "Wipe out all military planes, reduce your land and naval forces, then internationalization is possible." The Allied Powers retort, "Modify your opposition to internationalization (for we fear your big commercial planes) and we will reduce bombing planes." Thus the steps toward internationalization already so gingerly taken are accompanied, *pari passu*, by proposed reductions in bombing planes. (The English plan, the French plan.) Here, if ever, is a clear case of the terrible rôle which fear plays in international life. The amalgamation of all French aviation companies into a national company, owned and managed by the State, has inherent in it the first step toward actual internationalization of civil aviation as well as a unified air reserve. Peace or war will decide.

However, at this point in the evolution of the history of mankind, Europeans may take a first step toward the gradual, definite internationalization of their own air lines which would insure their own safety and the continued development of their national interests. For Europeans, some definite steps toward internationalization are actually imperative; accordingly the pressure of circumstances will more quickly bring about a solution than will be achieved in countries more widely separated from others, with, therefore, less need for haste. Nevertheless those countries must soon seek admission to such a combination of European air lines, for both selfish and unselfish national interests, either

on the basis of regional aërial police powers or in some other way.

Nothing can now stop this movement toward the binding together of the nations of the world by the progress of mechanical development except the annihilation of the nations. In the balance sheet for and against internationalization the brief summary of obstacles has revealed the complexity of the problem as well as the hindrances in the way of its achievement. Now the advantages shall be listed for final judgment.

The advantages of internationalization are numerous, but first, and yet again, the point is stressed that such internationalization of long-distance air lines (as well as those on the European continent), to be effective, must come under some aspect of the League of Nations, because the maintenance of peace, the use of international sanctions, and the repression of all aggressive warfare as well as help to the nations attacked would be definitely within the province of internationalized air lines, and therefore should be under the control of the League of Nations. This has been the French thesis from the beginning and, as the years pass, is proving more and more to be correct, though far-reaching in its effects. These political implications will be studied in detail in the last section of this book, for there the interrelation of security and world organization will be considered from the point of view of the common menace of aërial chemical warfare.

Other advantages in bringing together for the common good, under the auspices of the League of Nations, the competing long-distance air lines now under national control and development, are quickly listed: First, order out of the present chaos of air procedure; second, harmony between conflicting aims and policies for air expansion; third, closer contacts between national and international manufacturers,

owners, and operators of airplanes, leading to better understanding; fourth, through coöperation, to amalgamation for the common good; fifth, the immeasurable influence for the strengthening of the League of Nations; sixth, the only means of accomplishing aërial disarmament and, in turn, land and naval disarmament; seventh, the only means of changing from a fear psychology between the peoples of the sixty-two nations to the psychology of trust and belief on which is founded the future of civilization.

Eighth: from the point of view of the non-combatant, internationalization would remove the threat of keen competition between national air lines, since such action would involve the relinquishment of national control of these long-distance air lines to an international authority. Ninth: internationalization of civil aviation means increasing safety to the non-combatant from the angle of lessening emphasis on the military training of civilian and commercial pilots. This is all-important. Tenth: from another angle, the growing fear of the quick convertibility of peace-time aviation into war aviation which has haunted Europe for years would be resolved into a gradual realization that safety for the nations of Europe rests not upon national, competing, long-distance air lines, but definitely on internationalized long-distance lines, stretching across the continents, keeping the shorter lines in Europe perhaps under national control, with close supervision by the Permanent Disarmament Commission, for passenger, mail, and express service. For the sake of such advantages, the disadvantages must and shall be overcome.

What might be the gradual steps toward the achievement of this internationalization of civil aviation, the core of military and naval disarmament? Our experts would, of course, differ widely. They do. They are grappling with a very new and very complicated situation, whose ramifications lead into far fields not connected with the technical aspects

of actual internationalization. The emphasis is—and it must be—on the gradualness of these significant and momentous changes.

A brief summary is here given of what has been attempted in the past toward internationalization. Beginning with pre-war moves, and ending with the stand of the nations most concerned at the Disarmament Conference in 1932, a short, clear picture is presented of the achievements, problems, and practical obstacles.

Pre-war attempts at international control of civil aviation began surprisingly early, and to France must be given much of the credit for initiating gatherings to that end. Five International Congresses of Aëronautics were held in Europe before the war, beginning with one in Paris, in 1899, in which attention was chiefly given to the mechanics of flying, but at which governmental questions were also discussed.

Since the war, there has been such a heterogeneous development of international conventions and organizations interested in aviation that only the following list could convince the most skeptical that order must be made through a joining and amalgamation for the interests of all concerned.

To tackle the manifold organizations first. There are twenty-one such organizations in the international field, all interested in furthering aviation, nationally and internationally: (1) International Commission for Aërial Navigation (C.I.N.A.); (2) International Conference on Private Law Affecting Air Questions; (3) Ibero-American Conference; (4) International Aëronautical Conference; (5) Mediterranean Aëronautical Federation; (6) International Congresses; (7) International Aëronautical Federation; (8) International Air Traffic Association; (9) International Legal Commission on Aviation; (10) League of Nations; (11) Pan-American Union; (12) L'Office International

d'Hygiène Publique; (13) International Aëronautical Regulations; (14) Air Mail Conference; (15) International Radio-Telegraph Conference; (16) International Hydrographical Bureau; (17) International Chamber of Commerce; (18) International Meteorological Organization; (19) International Air Association; (20) International Standard Association; (21) International Committee on Illumination.

What a welter of overlapping, conflicting investigations and good intentions frustrated by conflicting interests. Then there are, since the war, twenty-eight international bi-lateral conventions, giving aërial rights of way, and aërial privileges, one to another. It is highly significant that none of the major nations with large aërial interests are involved in these bi-lateral conventions. No international agreement of any kind binds these major nations from the use of every ounce of their aërial and industrial strength for the indiscriminate bombing and destruction of a declared or undeclared enemy. Underlying these manifold organizations and bi-lateral conventions are some thirteen principles which attempt to contribute to some rudimentary order and clearly intensify the conclusion, just stated, as to the possibilities of air warfare.

Briefly, these thirteen principles are: (1) recognition of the principle of the full and complete sovereignty of each State over the air space above its territory and territorial waters, involving the right to exclude foreign aircraft; (2) the right of each State to impose its jurisdiction in the air space above its territory and territorial waters; (3) subject to the principle of sovereignty, recognition of the necessity of granting to international air navigation the fullest possible freedom compatible with the security of the State, application of regulations relating to the admission of aircraft of contracting States and international legislation of the country; (4) as regards internal regulations relating to the admission and treatment of aircraft of contracting States, recognition of the

principle of absence of any discrimination based on nationality; (5) recognition of the principle that every aircraft must possess the nationality of a single State and must be entered in a register of the State whose nationality it possesses; (6) concerning regulations about wireless apparatus and usage; (7) special treatment for military and naval aircraft; (8) recognition of the right to transit without landing for air mail and passengers; (9) the right to use public airdromes; (10) compensation for damage done by one State to another in the handling of aircraft; (11) recognition of the necessity for a Permanent International Commission for Air Navigation; (12) adjustment of international legislation to these principles; (13) recognition of the fact that these principles do not affect the duties and rights of belligerents and neutrals in case of war.

Actual proposals regarding the internationalization of civil aviation were made by representatives of several nations at the Disarmament Conference in February, 1932. Delegates of five of the less powerful air-minded nations all proposed some form of international control. The five were Belgium, Denmark, and Switzerland, with Spain and Sweden making the added suggestion that all military aviation be abolished. Among the greater powers France stands out as the only major nation having proposed the internationalization of civil air transportation under a régime to be organized by the League, on a continental, inter-continental, or some other geographic basis. This was a far-reaching proposal since it also involved, according to the plan, the distribution of orders for planes among the industrial plants of the various countries on a basis of their existing capacity, and it was even further hoped that authority might be given to such an organ of the League to requisition all machines for an International Civil Air Service. These ideas of the French delegation on internationalization were, they stated, necessary

for acceptance if the Conference was to adopt the French view of placing control of the major forces of military aviation in the hands of the League.

Today a modification of the French plan for internationalization, to meet the opposition expressed by other nations and to fulfill the principle of equality of armaments, seems to be evolving.

The French plan for internationalization calls for a convention for the suppression of all bombardment from the air and another agreement assuring assistance to any state which may become the victim of aggression, and, finally, the formation of an international aërial police force at the disposal of the Council of the League, with the League openly designated as the super-state. Thus political aspects, as well as technical, are closely linked together.

There is the hub of the whole problem of internationalization of civil aviation and, consequently, the rub. To be effective for all purposes and all emergencies, a sovereign body to which sufficient authority has been delegated by all nations interested in aviation and security (and which nation is not?) must decide the time, the means, and the method of aërial intervention. The success of the activities of such a body in case of the illegal use of force by an aggressor nation (or even the threat of such use) would depend upon the universality of the world organization under which such activities might be authorized. Only by being completely representative of all the nations could joint action on air problems meet the aërial menace and effectively keep the peace.

What are the immediate steps which might be taken to achieve an adequate form of internationalization so that the non-combatant would be protected? There are three specific means, each of supreme importance to effective internationalization: first, the abolition of all military and naval bombing

and pursuit planes; second, the international control of civil aviation; and, third, moral disarmament.

First, the bombing plane, whether military or naval, together with the pursuit and combat plane, must be, within a definite period of time, totally abolished. The definition of a bombing plane, though elastic, has been achieved at the Air Commission sessions of the Disarmament Conference, and should be applied to the air forces of all countries. Supervision of this abolition should be entrusted to the Permanent Disarmament Commission, and reports made and published yearly as to the progress achieved.

An important point, proving the necessity for the abolition of bombing and pursuit planes, is brought out in the unsuccessful attempt to formulate satisfactory rules applicable to aërial bombardment. The theory that a defended town or city is open to aërial attack and an undefended one is not would seem to be untenable. This theory had led to the formation of two contradictory proposals: first, all bombing from the air should be prohibited; second, bombing should be limited to military objectives and air attack to areas of combat. As the second of these is obviously impossible to control during a fierce air attack and defense, and the first is also obviously impossible as long as there are bombing planes, the fundamental step for us of this generation is to abolish all bombing planes.

The second step, international control of civil aviation, we shall consider from three points of view. From the technical point of view, some slight form of internationalization of civil aviation has occurred already. National companies are coöperating with the air lines of other countries to the end that planes may fly outside national boundaries. Joint airports are being used and joint lines operated. For instance, there are the Europe-Asia Aviation Company, representing the joint operation of the German Luft-Hansa and

other lines from China to Europe; the Chinese National Aviation Corporation, jointly owned by the Chinese Government and the Curtiss-Wright Corporation of the United States; joint operation of international lines from Yugoslavia in coöperation with Austrian and French lines; as well as a number of others.

International control of civil aviation on its technical side might well be amplified in two directions, industrial and financial. First, an international cartel or pool of airplane manufacturing companies might be formed in order to equalize the steady development of aircraft efficiency and that the competition for new designs and new markets shall not have military significance. (This, as one may recall, was also recommended for the chemical industry and follows progressive economic trends.) As the spread of the aircraft industry has so far been exclusively on a basis of national support or subsidies, geographically and strategically located for major effectiveness in case of need, such an internationalization of the industry should be, with sufficient goodwill and under the right auspices, possible to accomplish in the near future.

Progressing at the same time and at the same rate of development with such an internationalization of aircraft industry programs, the civil and commercial lines should be relinquished to an international holding company, whose financial control and supervision would be in the hands of a universal League of Nations, or, surely, in the hands of a permanent Committee of Transit and Communications, expanded to form an independent section of the League. The specific details of such an expansion cannot, of course, be worked out here and now, where the mere suggestion is all that is possible. That such a move would be a practical solution, robbing commercial aviation of its terrors and permitting its unimpeded, rational development, perhaps with

geographic allocations to certain groups of air-minded nations (never to one nation alone) is conceded.

A close connection between large transport and freight planes combined under a single unit of jurisdiction and the structure and work of the League, permits convertibility of the aircraft into military planes when needed,—but only on command of the Council of the League. This form of internationalization is significant when considered from the point of view of an international aerial police force, unarmed, but with the power to arm quickly when any nation of the earth may prove unamenable to economic or moral pressure, or to the scorn of publicity. The unity of such an expanding aerial force, its potential strength through convertibility to war uses if world peace is threatened, would be a sufficient deterrent to hold in check any nation, of whatever size and power, which alone might try to defy the world in flouting its international obligations and commitments. Such problems as details of administration and language barriers are trivial and easily surmountable, given the will to carry out this proposed program.

One obstacle which can be admitted to loom rather large, and of a seriously deterring nature, is the lack of universality of League membership. It must be freely acknowledged that, until all nations are members of the League, such an internationalization of civil aviation will be not only greatly hampered, but actually impeded. In the last section of this book this aspect of the problem will be dealt with in greater detail. The process can, however, be immediately initiated in a smaller area of action, restricted to the European member nations for a beginning, the technique being continually perfected through the gradual overcoming of obstacles, until all nations are ready to join. This conception of coördinated control of commercial and civil aviation is not visionary idealism, but the most practical realism which, if translated

into timely and positive action, would meet an alarming and increasingly serious situation.

Another important factor in the internationalization of civil aviation is the legal aspect. There are, first, the rules of warfare for the air, specifically the historical development of bombardment regulations, in which we are primarily interested in this study. In all such rules so far, bombardment has been considered a legitimate means of warfare within the sphere of military usefulness. Although in past wars non-combatants (naturally, then, beyond the limited range of gunfire) developed a recognized immunity to attack which crystallized in international regulations. Today, with the radius of the airplane expanding constantly, military usefulness demands that discriminate and indiscriminate bombardment from air, land, and sea be so effective that the distinction between combatant and non-combatant is wiped out, regardless of rules. (Recall, for example, the Japanese bombardment of Shanghai in 1932 when 30,000 civilians lost their lives.) *Since it is absolutely impossible to write and guarantee the observance of rules of warfare so that non-combatants may feel that their safety is guaranteed, the only feasible change is to outlaw all wars, offensive and defensive.* It is useless to try to humanize modern warfare by more legal regulations and to make tentative efforts to set up new laws for new conditions, only to see them broken when an emergency arises.

The positive side of legal regulation would be the development of further laws regulating air procedure in peace time, for the purpose of facilitating the internationalization process. Here the first move and main emphasis must be to wipe out as soon as possible that mistaken conception that the air above national territory is national air, to be traversed only with the consent of the nation concerned. What a hampering ridiculous conception this ruling has been! God's air belongs

to all. This ruling, despite French opposition, was firmly established in the 1919 Convention on air rules.

The result has been that one nation has bargained with another for air rights and air concessions and the whole complicated situation has been one of the main factors in the increasing national competition in air armament and highly unfavorable to the movement toward internationalization. Any nation which may desire to interfere with revision of this air rule is practically digging its own grave. The requirement that an airplane can acquire nationality only if owned entirely by persons of the same nationality or if owned by a company two-thirds of whose directors possess the same nationality as the aircraft, must be revised if internationalization of civil aviation is to become practical. Quoting M. de Brouckere, the Belgian expert, when he spoke before the Air Commission in Geneva on June 17, 1932.

"At present, a machine whose very flight constitutes an international action, international regulation of which is indispensable, finds itself hampered by the existing legal state of things."

M. de Brouckere continued:

"Various associations had made successive efforts to remedy this admittedly impossible situation. Their multiplicity had proved the vanity—at any rate partial—of the efforts made by each of these societies. There was an element in the regulations governing aviation which checked the tendency of such societies towards increased internationalization, limiting their activity and preventing them from obtaining the results they desired.

"For instance, the Commission Internationale de Navigation Aerienne (International Commission on Aërial Navigation), which should have the right to draw up international regulations for aviation, had merely the right to select the call signs and the marks to be placed on aircraft, to regulate the issue of certificates of airworthiness, to decide on the standard log-book to be carried, to regulate lights and signals, to fix regulations for air traffic, and to indicate the minimum conditions required for obtaining pilots' and navigators' certificates and licenses. It could produce international maps, fix aërial ground marks and, lastly, centralise

and distribute meteorological information. Any elements likely to guarantee peace, to prevent the abuse of civil aviation or the easy or voluntary construction of civil aircraft with military characteristics and the training of military aviators under pretext of developing civil aviation—all of which might contribute to rendering civil aviation a really peaceful organisation—were omitted from international legislation, a circumstance which singularly enhanced the danger with which the Air Commission was called upon to contend.

"Thus civil aviation had, both technically and commercially, developed along military lines. Though it might depend upon commercial receipts—considerable in the case of certain lines—it depended in the main for its development upon subsidies. This practice had meant the formation of a clientele consisting of the organs granting the subsidies—namely, the Governments—who considered that, in exchange for their money, they should be in a position to derive all possible military profit from civil aviation.

"In many countries the subsidies were granted upon condition that *aéroplanes* had certain military characteristics and that the civil aviation personnel undertook certain military duties. The Commission which had met at Brussels during the preparatory work for the present Conference had as long ago as 1927 asked that such practices should be abolished in order to ward against the danger of the use of civil aviation for war purposes.

"Were civil aviation purely commercial and nothing more, things would be different. It requires safe, convenient and economical working machines. This means that the lighting equipment, upon which *aéroplanes* are more and more dependent and which they can no longer do without, must be developed and rendered uniform. Military aviation, on the other hand, in order to advance into the enemy country, must have its own methods of flight and ignore the lighting equipment. Given the considerable number of practically useless lines created and the clearly inadequate development of lighting equipment, one can not help feeling that the fact that this lighting equipment is useless from the military point of view—in spite of its value for civil purposes—has brought about the present situation.

"The same preoccupations govern the organisation of the lines. These lines, international in their very essence, since they cross the territories of several countries, are almost without exception operated by national companies. The *aéroplanes* fly over national territory in virtue of sovereign rights and can not fly over neighboring territory without obtaining concession in exchange for other concessions—a complicated network of agreements subject

to all sorts of conditions. Almost all these conventions betray purely military preoccupations; flight over a certain territory is authorised but on conditions permitting the creation of inter-linked systems between militarily allied nations, commercial interests taking second place. This must continue until this host of agreements is replaced by certain common regulations bringing about closer coöperation between the national companies acting as if they were the various branches of a single organisation—in other words, until the establishment of great international companies.”

A new convention for the abolition of hampering legal restrictions upon the development and international control of civil aviation must be drawn up by an international gathering of all nations sponsoring aviation, followed by periodic gatherings of the same sort to legislate on international air rules binding in their effect. Such legislative activity should progress hand in hand with the development of the international holding company under the auspices of an expanded section for Communications and Transit of the League of Nations, for the purpose of developing a practical form of internationalization of civil aviation with proper legal safeguards. This move would guarantee the legitimate interests of all nations concerned and at the same time stimulate the fullest possible development of international aviation for passenger and express service. Thus is removed that constant fear—expressed today in all countries by increasing numbers of people—the result of considering civil and commercial aviation primarily as a military national adjunct.

The third important element in the internationalization of civil aviation is the political aspect. The administrative set-up might be largely handled by the following measures: shares in the holding company (whose headquarters should be in Geneva) might be issued to which the nations would be permitted to subscribe on a pre-arranged percentage basis, so that no one nation or group of friendly nations could gain a monopolistic control; with the issuance of such shares and

the actual initiation of an internationalized commercial air service, all government subsidies on a national basis and all government-supported aeronautical research, except as it integrated itself into definite international projects, should be abandoned. European subsidies total about 800,000,000 French francs yearly. Under this provision, a saving of 500,000,000 French francs could be made through the fact that the necessary expenditure under the new plan would be only about 300,000,000 French francs. These are important times for such drastic savings in a constructive enterprise. Such matters as complaints of air lines, matters requiring adjustment, and questions concerning the opening of new lines might be referred for settlement to the Permanent Disarmament Commission or the World Court.

That the stage of aerial development at which the nations now find themselves readily permits of the next imperative move, internationalization of civil aviation, can be proved by the following very interesting figures.

STATISTICS ON COMMERCIAL PLANES IN EUROPE IN
OPERATION DECEMBER, 1932³

<i>Country</i>	<i>Total Number of Civil Aircraft on Regis- ter of Country</i>	<i>Number of Operating Companies</i>	<i>Total Civil Aircraft in Operation</i>
Austria	58	1	10
Belgium	159	1	39
Czecho-Slovakia	138	2	27
Denmark	12	1	5
Finland	17	1	4
France	1,600	5	259
Germany	1,031	3	178
Great Britain	981	1	29
Greece	—	1	4
Hungary	73	1	6
Italy	578	6	82
Jugoslavia	9	1	9
Netherlands	61	2	43
Poland	125	1	28
Rumania	—	1	8
Spain	82	1	9
Sweden	22	1	7
Switzerland	79	2	15

³ From the *Journal of the Royal Aeronautical Society*, May, 1933.

There is now a certain degree of internationalization of civil aviation by regions. For instance, the Western Hemisphere is practically controlled in aviation by American-governed commercial aviation companies, such as the Pan-American and Grace Airways. In Europe, there is a certain degree of internationalization by agreement or operating methods between the eighteen aviation-interested nations. Soviet Russia's aërial expansion in Asia has been restrained within her enormous national boundaries and up into the stratosphere. The stage is now set for a gathering together of these isolated units into an intelligent world coördination.

Obviously civil aviation, despite the great number of reserves, is still in the stage of early development, just before a period of rapid expansion due to a return of increased international economic contacts. Now is the time to amalgamate these lines within Europe and the long-distance aërial lines outside of Europe operating under European capital. If this is not done in the near future, the competition in air strength between nations will lead, as competition has invariably led in every other field of armaments, to aërial war whose magnitude, based on military air strength, the commercial air strength, and the industrial strength of the airplane manufacturing companies to turn out great quantities of aircraft, cannot be gauged by this simple table above.

At the present moment it is impossible to find out the exact air strength of some of the major nations, for exact figures are not furnished, just as, in the old days, army figures were withheld to camouflage the actual strength of standing armies and possible reservists. With each new branch of the military force the same procedure, unfortunately, seems unavoidable: first, experimentation, then proven worth against military opposition; then research in technique and the development of plans for secret industrial expansion; then a war in which to try it out, in which an-

other new invention, developed through the stress and strain of the emergency, appears which, if it promises to be at all effective, goes through this same cycle. Only the unfaltering interest and interference of the non-combatant, now so definitely involved in warfare, can break this vicious circle.

The final element in this very general consideration of the major factors in internationalization of civil aviation (which, to do it justice, needs research and treatment, extending into a publication of several volumes) is known as moral disarmament. It is absolutely impossible to abolish bombing or any other sort of military planes, or to develop a workable system for the internationalization of the civil and commercial aviation of the various countries unless the attitude of the people who are members of the nations undertaking this extremely necessary and extremely difficult move is changed from one of distrust and suspicion, calculated to lead toward conflict, to an attitude of understanding, of willingness to coöperate through every channel open to these nations to meet and forestall the common dangers which face each and every nation if the nations again resort to armed conflict. This most important of all factors in the three-fold movement toward the internationalization of civil aviation has been summed up in the phrase, first submitted by the Polish delegation to the first World Conference on the Limitation and Reduction of Armaments,—moral disarmament. This phrase, so important, will be enlarged in the chapter entitled "The Last Defense."

Here, it is only possible to suggest ways out. For instance, in helping to lessen the tension between nations (which reacts on their attitudes toward disarmament), Germany and Poland have again set the pace by initiating a "propaganda alliance," something quite new in international alliances. The official despatch announcing this new kind of alliance, reads "—To promote the effect of the recent Polish-German agree-

ment, the representatives of both parties have determined their common will to coöperate on all questions in forming public opinion in their respective countries to the end that mutual understanding may be increasingly awakened and that a friendly atmosphere may thereby be assured. Complete unanimity was reached respecting the steps to be taken in the fields of the press, authorship, radio, moving pictures and the theatre."⁴ There is a concrete sign of the willingness of two nations to handle this problem of developing friendly relations between their peoples, on a wise plan. In such manner, the fear psychosis subsides and the control of aviation on a constructive scale is made possible.

Summary and Conclusions

In the preceding chapter we have shown the difficulty in the adoption of any provisions for aërial disarmament, because the airplane industry must expand and the commercial use of aircraft develop. There is no safeguard against the aërial menace as long as civil and commercial aviation develop unchecked by any form of international supervision and control. Neither can the non-combatant expect any immunity from the observation of rules regarding aërial bombardment, for we have shown how inadequate these prove under modern conditions of warfare, and how, by accident, or in connection with a supposedly legitimate attack on some military objective, or even in the attempt to break a nation's morale, the civilian will be the principal sufferer.

We have briefly reviewed the obstacles to international control of civil aviation, but, in view of the advantages, have concluded that the effort was worth while because it is one means to avoid an air war—the greatest human concern of today. We have suggested that Europe might begin with its own regional air problems, and develop some workable form

⁴ New York Times, Feb. 26, 1934.

of internationalization first there. The full benefits of such international control will have to come with the advent of an all-inclusive world organization in which all nations are members, and in which all are willing to unite in a plan for joint administration of civil aviation under League auspices. This will take care of the industrial integration of aviation and its financial aspects. Then schedules can be set up for the efficient, fear-dispelling operation of the world's air lines on an international set-up.

In a subject as complicated as this, with so many varying aspects, and so many varied opinions, it is the better part of wisdom to summarize. In this summary, then, there will be two parts. Those immediate objectives for the protection of the non-combatant against aërial bombing which should be attainable within the next five years will constitute the first part; the second part will then consist of those objectives finally attainable in a longer period after the first objectives have been gained.

These suggestions presuppose that the Four Power Pact recently signed by the major European nations will be strictly adhered to in the spirit as well as the letter.

For immediate objectives:

1. Prohibition of the incorporation of military features in any civil or commercial aircraft by any aircraft-producing country. (This aids the conversion lag in adapting planes to war uses, short as it is in aviation, and tends to remove some of the fear and also the immediate encouragement for the military usage of commercial planes. It does not actually prevent such use.)

2. Full publicity as to the actual air armaments of each nation and the commercial and civil air strength in each nation through the League of Nations' yearly armaments report.

3. A system of checks by licensing of numbers of civil

and military planes exported, with the clear designation of the destination of each exported plane. (This will show how and from where non-producing nations receive their war planes as well as indicating when air export competition, too keen for health, may lead to war.)

4. Regular and full reports from all League and non-League members to the Permanent Disarmament Commission as to the above facts. Full power to the Commission to investigate on the spot when necessary.

5. Abolition of all military planes (not merely bombing planes).

6. Amalgamation of international congresses and organizations interested in aviation into one such international organization, for the benefit of aviation for all countries.

For final objectives (perhaps after a period of five years):

1. Revision, clarification, and extension of air laws—removing from international law the provision which holds the air above a nation's territory to be national air, and agreeing instead that all air is international (which it so obviously is).

2. Amalgamation by gradual but definite steps of European and American aircraft manufacturers into an international organization with power to limit production and to allocate orders. This is a natural extension of national amalgamations now going on extensively within the respective countries. This assumes the elimination of the weak, inefficient companies, a necessary step in all business combines.

3. Creation of an international holding company for commercial and civil air lines, both within and without a nation's boundaries, with political guarantees that the stock so issued will be held only by the nations involved,—not for sale, and not distributed to the advantage of any one nation. Headquarters for such an international company would preferably be in Geneva, and, in return, an understanding that if any

nation breaks its international commitments, this internationalized system of commercial aviation shall be put at the disposal of the Council of the League for conversion and war usage. The pilots of this new aërial force will have international standing, not subject to any one nation, and, on their scheduled flights on long-distance air lines, will act as a supervisory police force, reporting to headquarters at Geneva whenever trouble is pending. The power to act can be granted only by those in authority at the headquarters.

4. Headquarters reports to the Secretary General of the League when such disturbances are serious and vice-versa. Such an international aërial police force will be important to hold peace among nations. This obviously lessens the authority of the national State in its outlying dependencies, but such gradual lessening will be superseded by the gradual extension of the membership in and authority of the League. This political readjustment has started, as we have pointed out, and will continue more quickly as nationalistic faith gives way to coöperation between nations in such a world organization.

Are these suggestions utopian and impractical? Before judging too hastily, one might profitably review the progress of the last fifteen years. The utopian—outlawry of war—has become actual; the seemingly impractical—wireless telephony—has come into daily use. In similar manner will the internationalization of civil aviation become actual and practical.

The airplane and the wireless have made of our world a place so much smaller than the world in which our grandsires or our fathers lived,—a smaller world, in which we can send messages to any part with almost the speed of lightning. It is true we can fly from one corner to points half way 'round in less than a week. We rub elbows with men of all races and languages, we drive bargains with them as our fore-

fathers used to deal on market day with farmers and townspeople who lived within a few miles. We use the products of the ends of the earth to perfect our mechanical equipment. This neighborliness is an advantage if we carry on our international relationships in an atmosphere of friendliness which makes further coöperation possible. Such close contacts, however, have their dangers if we do not realize the overwhelming necessity of adapting our organized life to the changes brought about by all this inter-communication, if we do not see that a world community must be built up which will aid the further development of our newest inventions for constructive uses, rather than allowing them to become sources of danger.

We wish to emphasize again that the citizen of any large industrial country wherever located which may again engage in warfare cannot consider himself or his nation safe from the present uncontrolled threat of aërial warfare. There is no adequate form of mechanical or political protection at present. There must be world-wide coördination looking to the ultimate unified control of civil aviation and complete elimination of bombing and all other military planes, with the moral support of the peoples of the earth. Then, in a united determination to build foundations of a new world order, the generations of today and the generations to come may safely enjoy whatever benefits new inventions may bring.



PART III

THE EFFECT OF AËRIAL CHEMICAL WARFARE



CHAPTER I

TWENTIETH CENTURY MASS MURDER

THE phrase—mass murder—as applied to modern war needs clarification, even after so much proof of its inevitability. There is an inherent juxtaposition of thought, resulting in a possible loop-hole through which confusion might enter. The point has been taken that war as such is legal, but murder is not legal. Hence, combining the two thoughts—one legal and one illegal—creates one grand mistake. But those who take the position that war is legal today, are holding a very shaky argument against a stream of proof to the contrary. Wars of aggression have been outlawed by the Pact of Paris. Treaties of non-aggression have been formulated to an ever-increasing extent and we shall see later under the discussion of how much security for how much disarmament, the steady development under the auspices of the League of Nations of the movement to wedge out all wars. The United States has taken a leading part in this movement to make illegal all wars by sponsoring and advocating the Pact of Paris and the so-called Stimson doctrine. So the nations are realising that for their selfish interests, it is the wiser part of polity to make all wars, of defense as well as of offense illegal. Why has not this movement been more successful to date? Simply because there is no central authority to which all nations bow in time of international crisis, which is universal in membership and powerful as to decisions. Hence, a nation still tries to defy its international commitments. Mass murder is no

longer a contradiction in terms as applied to war methods for murder and war are both illegal. There is still murder in the world, there are still wars.

The reasons for starting or entering on a war have always been and still are legion.

"There always will be war."

"There always has been war, therefore it lies in human nature to continue having war."

"People are believing more and more that the settling of disputes between nations by violence is inevitable."

"Wipe the other fellow off the earth, regardless of all this peace stuff at Geneva or at home."

"The red-blooded fighter, in him lies the safety of the Fatherland."

"What is the answer to these moves against our national security, against our territorial integrity? Military preparedness, more bombers, more poison gas, more armies, more tanks, more submarines, more cruisers, more armaments, and bigger, more effective wars. That will settle everything."

"For more markets, for more raw materials, for the spread of our surplus population from our overcrowded national boundaries, we must fight our way."

"Capitalism versus facism, versus communism, versus every other economic 'ism,'—the only answer is war. The victor is always right. Might makes right."

"Peace and international capitalistic imperialism are incompatible."

"Train our children to hate our historical enemy. Then our national tradition is carried on safely."

"More children, more population, more armies, more wars."

"Wipe our militarism with militarism. Force against force."

"Trust the other fellow? How can you trust a foreigner?"

Someone who speaks a different and strange language, someone who has different habits, different religious customs, different clothes and different ideas of everything. Trust him? Not me. Arm against him,—that's the only answer."

So some of the arguments for war run on. Each of us believes in one or more of these ideas and has openly and often declared his unshakable conviction in his belief. Each nation believes in one or more of these ideas and announces in good round terms its unshakable conviction that this belief is justified. So armaments pile up, for we need all the armaments we can get if these ideas are to prevail. There is no other answer. The necessity for the continuation of war is self-evident on such a basis. The continuation of war makes it essential to continue these ideas and, in turn, these nationalistic ideas are continued, developed, and spread by the war system.

In human affairs there is always action, reaction; the rhythm is as steady as the rhythm of the heart. Systole, diastole, expansion, contraction—so history goes. The causes of war change with the changing times, but war has continued.

Cave-man battled cave-man, following the example of the animals around him. Tribe battled tribe for good feeding grounds, then slowly settled down to tribal homelands. Now these tribes grew into relative greatness, but still they battled. Egyptians were overcome by Syrians, and Syrians by Greeks. The Greeks, after varied vicissitudes with independent republican states and rebellious philosophers, were in time overcome by the powerful Romans. Invaded from the north by barbarians, the mighty Roman empire was overcome by the virility of this rising tide of force. In time these tribes settled down into groupings or feudal states.

The main occupation of the feudal lords, heads of the new states, was the raiding of neighboring states. With the

slow spread of Christianity came the religious wars, great migrations of people carrying the cross and sword for the imposition of Christian ideas and European trade in the saintly name of chivalry. Feudal states gave way in time to city-states which warred with one another for the achievement of local expansion. The duel settled the individual balance of power. Might made right. City-states were by wars amalgamated into nations. France, Italy, Germany, were born as nations in the eighteenth and nineteenth centuries. Then dynastic wars between nations became frequent. Finally, nations grouped themselves into alliances and ententes in the late nineteenth century and, by the beginning of the twentieth, their kings and statesmen were ready for a world war.

Throughout this progression of historical events, there were ostensibly hundreds of reasons why war should be used to settle disputes and to carry forward the torch of civilization. For food, for better shelter, for more lands, for more trade, for the spread of religion, for the subjugation of disorderly neighbors, for personal power, for the kingship of brothers, sisters, aunts, etc., for more colonies, for more railroads in other lands, for the glory of the country, for the quieting of revolutionary forces at home, to make the world safe for democracy, a war to end wars, or for a combination of these causes, or for a variety of reasons which are not all divulged at the time of immediate action. Thus we understand how important it has always been to whip up by artificial propaganda the warlike desires of the normally peace-loving common soldier who must fight and die in these wars. Differences of opinion between nations, voiced by press, radio, and official spokesmen, irritated to fever heat by mass psychology, which is inflamed in turn by press, radio, and other propaganda, inevitably flare up into war.

All this continues to be true today. The common man is

just the recipient of orders either at the point of the gun or the point of the pen: to do as he is told by his superior officers or by his government, to leap into the breach created for the fight,—that is his job. Looking back over the centuries, the causes for his job have seemed at times ludicrous to modern eyes, and at times questionable. For today the common man is thinking and reading as never before. Clear it is now that he, the common man, is the scape-goat.

He begins to see that personal safety and national safety, so closely linked together in the past by war, must now be linked together by other means. He sees that war is too expensive in men and money. Militarism demands for our fighting machines the carefully selected men; militarism is the training and killing off of the intelligent, those eminently fit, and the survival at home of the unfit—the unintelligent and the physically handicapped. We see that there will always be an excuse for war—even a cause might be scraped up—but we have seen in this book that the self-preservation of the individual and the nation demands recourse to the conference table for constructive settlements between nations. Warfare today, in the final analysis, involves in its deranging, maiming, and annihilating, all men, women, and children within the battle area. The common man begins to understand at long last.

Modern Battleground Anywhere

Modern warfare demands, then, a new technique. Mass murder for massed populations is essential to the imposition of the will of the victor. Masses are involved in the aërial, chemical warfare of today and the future. War or peace, armaments or disarmament, it's all a question of large numbers and closely knit organization. The scale is international, not national. It is a differently constituted world from the days of the medieval castle or the stage-coach, or

even of the alliances and ententes of 1914-1918. Nations, led by their kings and statesmen, have been, and still are, grabbing and squabbling, pushing and fighting; but we, the common people, shall eventually insist that they must conciliate or mediate, arbitrate, and, above all, educate. That, in the light of conditions as they are today, is our battle,—a battle waged on every front of human activity, converging from all lands on a definite goal, for the definite benefit of each and all.

Some one recently described this process in these vivid terms:

“War today is a prostrate giant—like Gulliver, tied and pegged to the ground by innumerable tiny ropes while the Lilliputians, clambering up and down this giant’s sides on tiny ladders, keep adding more small ropes, more pegs, hopelessly enmeshing the giant, keeping him prisoner forever.”

The ropes are the international treaties, the pegs are the thousands of unofficial attempts of international organizations and of individuals to hold steady and fast this giant by the essential groundwork, slowly strangling his convulsive reactions and hastening by all means possible the eventual death of the giant. Then the Lilliputians can disarm completely.

It surely is then in order to ask the question: Why hold a book on disarmament so largely to the discussion of chemical warfare, mobilized industry, and a survey of aviation today and tomorrow?

In case of a war between industrial nations (and all nations have been since 1918, as we have seen, on the way toward intensive development of industry and mechanized agriculture within their borders), two instant demands must be met: first, peace-time industrial preparedness with a supervisory military organization ready to confiscate the production schedules of appointed factories and expand on a war

scale so that the terrorization and annihilation, by any and all means, of crowded and strategic centers of enemy population may be achieved; secondly, quick transportation of men and material for offensive and defensive uses. That industry and aviation are the keystones on which national security is finally based today is abundantly clear to the student of modern civilization. Only these two factors meet modern specifications for efficiency in warfare. No two industrialized nations, no two groups of industrialized nations can afford to interlock their aërial and industrial forces in mortal combat from now on unless they are willing to face the terrible consequences of such arbitrament by force.

With the use of bombing planes, the battle-ground may be anywhere. Hence the civilian comes into the war picture as never before. A British authority, Sir Samuel Hoare, former Secretary of State for Air, said in 1925:

"It is . . . probable that the critical battles of the future will be fought over great cities, and the chief sufferers will be the civilians—men, women, and children. . . . In the late war some 300 tons of bombs only were dropped upon this country (England). Air forces of today could drop the same weight in the first twenty-four hours of war, and could continue this scale of attack indefinitely. I need not dilate upon this terrible and repulsive picture!"¹

We have also seen during this study how, as a result of recent developments of this new arm of warfare, aviation, the older forms of war-making and forms of war munitions are gradually taking a relatively less important place, destined for ultimate extinction. This adjusting process is due in great part to the ceaselessness and uncontrollable development of aërial chemical warfare, the symbol of the partnership of industry and aviation. This movement toward the abolition of outmoded forms of armament is of great interest and significance, particularly if this trend will—and it should

¹ From the *London Times*, October 17, 1925.

—lead to their immediate drastic reduction and, for the sake of economy, their eventual abolition.

These profound changes in armaments emphasis are disquieting to the militarist and, from another angle, to the peace advocate. The one sees his job, with all it implies of prestige and power, slowly fading away; the other watches uneasily the coming stages in the evolution of a constantly turbulent world. The technical uncontrollability of chemical warfare and of civil aviation which can be adapted to war uses has been demonstrated in detail. It presents the white race, which leads in this development, with the choice, more clear-cut as the years pass, between salvation by peaceful adjustment of international disputes or annihilation within the battle zone, wherever that may be, by war.

Nationalism Rampant despite Interdependence

We are living in a period of transition, of thorough-going change. All transition periods, throughout the long range of human history, have been turbulent. Our times seem even more turbulent, for the whole world is affected. We know about disturbances abroad much more quickly than our forefathers knew what was happening in the next city. Newspapers distribute news from the far corners of the earth more efficiently and more quickly than our fathers exchanged letters or even cables. So all the sixty-two nations feel their own and each other's "growing pains" in a more intimate manner. Such intimacy, to be harmonious, demands coöperation, not national exaggeration. This realignment of national and individual psychology on the basis of a growing intimacy between the peoples is a fascinating study.

Surely the study of nationalism as it manifests itself today is exceedingly interesting and important. Aggressive nationalism under dictators, nationalism under monarchies, repub-

lies is all motivated by the same primal causative force, the fundamental urge for food and work for the peoples within the national borders. This economic nationalism, modern to the extent that its intensity has increased, has supplanted the political nationalism of the eighteenth and nineteenth centuries. Just as in those days, today nationalism takes on varied superficial aspects connected with the psychology of this primal urge for the superiority of the one nation over others. The connection with super-patriots who howl their patriotism louder than any one else, often for personal benefit, the swaggering public gestures of some of our noteworthy modern dictators, renovation of buried glories and musty museums, all are directly connected with an exaggerated expression of nationalism. Nationalism and patriotism are directly connected but exaggerated nationalism develops an exaggerated patriotism which produces such freaks—as one hundred per centers, black lists and other phenomena, adjusted to the habits of each country. Each one of us can rehearse these astonishing exhibits of exaggerated nationalism in each country. They are the logical outgrowths of the intense struggle between the nations for self-assertion, and self-containment, economically, politically, culturally, financially, etc. The nations engaged in this intense struggle, using these means of exaggerated nationalism are slowly finding out that the intense emotions thus aroused are difficult to control. The logical result is exaggerated militarism which we see on all sides.

Mass armies, increasing navies, expanding military aviation, military expansion, and sure intensification, and mass murder are the inevitable concomitants of exaggerated and fruitless attempts of the nations to go it alone. The concept of von Clausewitz, a nation in arms, has been driven to the *reductio ad absurdum* of training children from five years on how to bear and handle arms. No nation is or can be

economically independent of other nations, today and from now on. No nation is or can be politically independent, today and from now on, for security demands coöperation. Exaggerated nationalism is definitely though grudgingly giving way to enforced international coöperation. Once this economic and political interdependence is openly acknowledged, the movement toward a world organization will be overwhelming in its intensity.

New Definition of Patriotism in the Light of Aërial Chemical Warfare

The fever of unhealthy nationalism, supercharged patriotism, will subside and with its disappearance will go exaggerated and useless militarism. Today and from now on, a new definition of patriotism must guide us on these new paths. What shall this new patriotism be? How hold the best of the old with the stimulating challenge of the new? Nowhere have I found a better summary in one statement than this, from the "Autobiography of a Philosopher," by George Herbert Palmer—"Evil patriotism tries to isolate itself, to the disparagement of other nations; just patriotism cherishes the characteristics of its own people because they form a distinctive contribution which it can make to internationalism." That is the new path for the nations to tread.

Irresistible forces are helping this psychological change from national self-sufficiency to international coöperation. Mechanically the nations are bound together as never before by radio, wireless telephone, airplanes in the ether or stratosphere; commercially they are inextricably bound together by their interrelated trade, their unceasing mutual need for markets, their desire for the exchange of raw materials and the finished products of industry; financially they are bound inextricably together by such a criss-cross of investments as only a magician can disentangle.

Changing Eras are Turbulent

Forced to change, we stand groping toward a plan for a new world order. Before our very eyes is the crumbling of the old order, the changing of the present order, the building for the future. Crumbling under the impact of world forces, changing by international coöperation, building for a new world society by drastic disarming,—this is indeed a period of transition.

What is the next logical step? The application of those standards of morality which, accepted by individuals as between themselves, must be applied to nations as between themselves. The process involves the substitution of law for war, and the development of the necessary respect for observance of international law as the definitive solution of legal disputes, eternally arising between nations as long as nations survive. Centuries elapsed before individual disputes were submitted to due process of law. Nations must travel the same path more quickly.

The other alternative? War—twentieth century mass murder in the suicidal attempt at settlement of these recurring international disputes, an attempt whose futility has even now been richly and dramatically proved by these troublous post-war years. These pages, devoted in part to a study of the preparations for modern war, have not been intended to arouse fear, but rather to stimulate the judgment of those who can see in the facts set forth the uselessness of militarism at once to protect the civilian population (its historic job and *raison d'être*) and to settle disputes between nations on a constructive basis.

Summary and Conclusion

The nations are passing through a convulsive era when the habits of centuries—the recourse to war for the settlement of disputes between nations is being forced by modern de-

structive inventions to give way to a new habit—a new technique for the settlement of disputes. Giving up an age-old habit, encrusted with pomp and glory is very, very difficult. Especially so as the reasons for flying to arms still exist. These reasons for war will be with us for a long time but new methods are evolving to resolve these age-old reasons because recourse to war involves today every inch of a nation's strength as measured in man and woman power, in industrial preparation, in war psychology.

Conclusions—As we grope from nationalism into a new form of internationalism, the realization is slowly but clearly dawning with the common man and woman that militarism, under its modern extremes, involving every living thing in the battle area, insisting upon military training from five years on, constantly inventing new and more terrible, more widespread means of destruction, modern militarism is not helpful and cannot protect the people against similarly developed extremes in other nations; modern militarism is useless to protect the homeland; modern militarism is too expensive; modern militarism demands a constant psychology of fear and hatred which reacts to the detriment of all peoples, exposing the nation to attack, inciting the people to arms when neither attack nor arms can or will protect the common man and woman, the target in the next war.

CHAPTER II

TWENTIETH CENTURY DISARMAMENT

THE movement toward disarmament is not emotional nor superficial. It is, on the contrary, based on fundamental forces which are just beginning to be felt. To rightly understand these powerful forces, slowly gaining momentum, it is necessary to look backward for a brief historical survey of disarmament to date, before looking forward.

Short History of Disarmament Conferences since 1918

Rarely in the history of warfare did the victor nation or nations stipulate so radical a disarmament of the conquered nation or nations as was imposed by the Treaty of Versailles. This startling fact accounts for the intense bitterness with which the Treaty is regarded in Germany, and the equally intense feeling with which it is regarded in France. The provisions of the Treaty which require this disarmament are predicated on the statements that the Allied and Associated Powers are likewise to disarm. These statements are contained first in the preamble to Part V of the Versailles Treaty, which states that

"In order to render possible the initiation of a general limitation of the armaments of all nations, Germany undertakes strictly to observe the military, naval and air clauses which follow."

As a result the German army is limited to 100,000 men recruited on a voluntary, long service basis, and called the

Reichswehr (now absorbed by the Hitler Government). Territorial and reserve forces are forbidden, as are tanks, armored cars, military aircraft, and guns and howitzers above a certain calibre. German forts on the western and eastern frontiers have been demolished. The Treaties of Neuilly, St. Germain, and Trianon limit the armies of Austria, Bulgaria, and Hungary to, respectively, 30,000 men, 20,000 (later increased to 35,000) men, and 35,000 men. All four countries are absolutely forbidden trade in arms and war material. But as no limit was placed on the amount of money that could be spent, the tendency (in Germany, at least) has been to develop within the prescribed limitations pocket battleships and pocket armies of enormous efficiency. Supervision for some years was retained by the Inter-Allied Commissions of Control.

The Allies themselves, in answer to a German complaint in a note or observation in May, 1919, said,

"The Allied and Associated Powers wish to make it clear that their requirements in regard to German armaments were not made solely with the object of rendering it impossible to resume her policy of military aggression. They are also the first step towards the reduction and limitation of armaments which they seek to bring about as one of the most fruitful preventives of war, and which it will be one of the first duties of the League of Nations to promote."

On this statement all the hopes of Germany are pinned for actual disarmament of the Allies, and all the succeeding attempts at disarmament have been founded upon the League of Nations and within its structure. Article 8 of the Covenant of the League carries this purpose a step farther by saying,

"The Members of the League recognise that the maintenance of peace requires the reduction of national armaments to the lowest point consistent with national safety and the enforcement by com-

mon action of international obligations. The Council, taking account of the geographical situation and circumstances of each state, shall formulate plans for such reduction for the consideration and action of the several Governments.

"Such plans shall be subject to reconsideration and revision at least every ten years. After these plans shall have been adopted by the several Governments, the limits of armaments therein fixed shall not be exceeded without the concurrence of the Council."

So the Allies pledged to each other a reduction of armaments through the League structure which they signed and ratified as part of the Treaty of Versailles.

What has been done to live up to these pledges?

The first move was the Washington Naval Limitation Conference of 1921-1922, where the five naval powers, Great Britain, the United States, France, Italy, and Japan, pledged to each other a limitation in the size and number of battleships on the ratio of 5:5:3:1.75:1.75, giving the United States and Great Britain parity in battleships. Then comes Japan, in a category by herself, then parity for France and Italy (neither of which nations are very much interested in the expensive super-dreadnought). This agreement entailed the scrapping of seventy ships, all of which was carried out by 1925. This left Great Britain and the United States with priority in the battleships, Japan with nine, and France and Italy with five each. The total tonnage of aircraft carriers was limited to 135,000 tons for the United States and Great Britain, 60,000 tons for France and Italy, and, for Japan, 81,000. Thus was stopped an incipient race in battleship construction which was seriously threatened after the close of the World War, on the basis of the theory that the freedom of the seas was dependent on which nation had the greatest number of battleships. Where is the freedom of the seas today, with airplanes flying over every ocean?

Then, following for the moment the fate of naval limita-

tion, we come to the Geneva Naval Conference of 1927, summoned by President Coolidge, to which only the three naval powers accepted invitations—Great Britain, the United States, and Japan. This conference was a complete failure, not only for lack of preparation, which was obvious, but also because sinister influences were at work behind the scenes. It does no harm to recall the revelations of the paid American propagandist, William Shearer, who was sent over to Geneva by American munitions and ship building firms, to prevent, if possible, any naval agreement in the limitation of cruisers or submarines, for which purpose the conference had been summoned. He was successful, for the conference not only failed, but also strained the relations between the United States and her naval rival, Great Britain.

In justice to the powerful, wealthy United States of those days, it should be remarked that never before has it happened that a nation possessing strategic position, economic resources, and technical ability was willing to hold back her great resources (which could easily have given her the mastery of the seas) in a willingness to accept parity with the leading naval power of that day.

The abortive Anglo-French naval agreement of 1928, to which none of the other naval powers would give their support, led up to the London Naval Conference of 1930, whose way had been diplomatically smoothed by the acceptance of the Pact of Paris by sixty nations, outlawing all wars of aggression, but permitting wars of self-defense. The ever close connection between disarmament and security by international agreements can be here demonstrated clearly. For the London Naval Conference did reach agreements between Great Britain, and Japan in the limitation of aircraft carriers, cruisers, destroyers, and submarines; in a refusal to lay down the capital ships which the Washington Treaty

permitted between 1931 and 1936; and the rules of international law applying to the use of submarines in war time. Neither France nor Italy, now bent upon a cruiser- and submarine-building race, would sign this treaty. However, since this London Naval Treaty was adopted, relations between the United States and Great Britain have been much more cordial, and this understanding has helped to stabilize the relations of other countries.

All this time (from 1921 to 1930), while naval limitation in all the different categories was being regulated, the League of Nations was as busy and as determined to succeed with the far more difficult problem of limitation and reduction of land and air armaments.

From 1920, when the Council of the League appointed a Permanent Advisory Commission on Armaments, until the opening of the first World Conference on the Limitation and Reduction of Armaments in February, 1932, League commissions were studying the problem of land and air armaments. Through various changes in its title, in its personnel, and in its agenda, these League commissions explored every avenue of approach, every national angle, every national inconsistency, and every international implication for the interaction of security and disarmament. Among the many pronouncements which resulted, two should be stressed. First, the Draft Convention of 1930 (which had been slowly shaping up through the intervening years through the contribution of the nations whose delegates were members of this Preparatory Commission) formed one part of the agenda for the world conference on disarmament. Secondly, the statement of the British delegation in the form of another Draft Convention, presented on April 28, 1933, is part of the basis for the final first disarmament convention. This deals with the limitation and reduction of the forces of

"effectives" (men trained for fighting), giving Germany an increased army to meet her plea for equality, a reduction in land armaments of the Allied Powers, limitation in the sizes of tanks and guns, an equivocal stand on the abolition of bombing planes "except for police purposes in outlying regions" (which allows great latitude and permits bombers to be retained), no allowance for Germany's plea for equality in air armaments, and abolition of chemical warfare. Altogether this Convention in its wording on chemical warfare is a weaker draft than the 1925 Protocol, which was not ratified, and which, on the other hand, does not prevent government preparation for chemical warfare (a serious loophole). The British Draft Convention, further provides for a Permanent Disarmament Commission which is to investigate conditions behind the military reports of the Governments (the United States has accepted supervision and investigation by this Commission—a great step forward). Such questions as the budgetary limitation of and manufacture and trade in arms are still in the fluid state (1933).

The first World Disarmament Conference is trying to conclude the first period in the attempt of all nations, on a united front, to rid themselves of the incubus of the war machine. To what extent has this been accomplished?

The Armaments Burden of Today and Its Causes

It is disheartening to reveal at present, what pitifully small success has been achieved in the removal of the incubus of the war machine. These figures, compiled by Mr. William T. Stone, research director of Foreign Policy Association, tell the story as graphically as is needed.

"The six great powers, excluding Germany, are spending sixty-five per cent more on their armies, navies, and air forces than they did the year before the World War.

<i>Country</i>	<i>Total National Defense Expenditure</i> <i>(army, navy, air—in millions of dollars)</i>		<i>Percentage of</i> <i>increase or decrease</i>
	1913	1930	
Great Britain	375.1	535.0	+42
France	348.7	455.3	+30
Italy	179.1	258.9	+44
Japan	95.5	232.1	+142
Russia	447.7	579.4	+30
United States	244.6	727.7	+197
	<hr/>	<hr/>	
Total	1,690.7	2,788.4	+65
Germany	463.3	170.4	-63
	<hr/>	<hr/>	
Total	2,154.0	2,958.8	+37

"The total annual cost of the armies, navies and air forces of the world is approximately four billion five hundred million dollars. One year's outlay for national defense would pay the expenses of the League of Nations for nearly seven hundred years."

These are the figures that talk. What do they say in plain words? THAT THIS EXPENDITURE, OUTRAGEOUS FROM THE POINT OF VIEW OF THE CRYING NEEDS OF THE WORLD, DESTRUCTIVE FROM THE POINT OF VIEW OF USAGE AND UPKEEP, THIS MASTODON OF MILITARISM DOES NOT BRING SECURITY, CAN-NOT PROVIDE PROTECTION.

The causes for excessive armaments today may be simply stated: (1) political insecurity due to the fact that the League of Nations is not universal in membership nor perfect in operation, notably in connection with the adjustment of frontiers or the peaceful transfer of territory from one sovereignty to another—the key to insecurity and political disarmament; (2) economic insecurity, which leads nations, financially bankrupt, economically unsound (and what nation is economically steady today?), to lay up more armaments against other nations equally unsteady financially and economically, who retaliate with increased budgets for armaments; (3) habit, for nations have always been armed—

therefore they must continue to increase armaments; (4) prestige, for nations, in the final analysis, measure their greatness by the size of their armies and navies, not by their geographical size or cultural contributions; (5) power, for nations base their power on their armaments as long as right is measured by might. There are many other causes for armaments today, but these are the main causes—and sufficient, too, to account for the burdens under which the nations are staggering.

However, a new element has come into this age-old problem of more and more armaments. In the past (before 1919), and even today to a certain extent, armaments were and are measured by such ponderable, easily counted, easily controlled elements as battleships, cruisers, airplane carriers, etc., for the Navy; for the Army, so-and-so many men under arms, so many reservists, so many long-range guns, a certain number of machine guns, so many daggers, so many tanks, so many tents, etc. But who can count the number of chemical laboratories in industry, in research, producing what kinds of gas, and how much? Who can count the imponderables in modern warfare without which a war can never succeed—the psychology of the peoples, the slogans and songs that send men singing to their graves? Then, too, the airplane, in use in peace to an ever-increasing extent, is easily convertible into a war plane. Its wide range of flight, its rapidity of flight, its power for surprise attack, make it a new element in warfare so radical that old forms, types, and ways of waging war are outmoded. The bombing, fighter, and pursuit planes of today are as different from the reconnaissance, photographic, and bombing planes of 1918 as the modern automobile differs from its early ancestor. This constant improvement of the military plane—each country vying with its neighbor in bringing out a new, more efficient, more deadly type has had an incalculable influence on modern

warfare as well as on modern life. These are the new means of warfare, outmoding the older methods.

How Disarm? Effect of Aviation on Older Forms of Armaments

On the older forms of armaments, the growing strength of these imponderable elements in warfare should have the following effect if the nations and their military leaders would keep pace with the new. Possessing huge national deficits, each nation for its own selfish interests, must and is beginning to evince an attention to the development of the only form of security which is really secure—international coöperation—as they have been giving in the past to the building up of armaments. Then, with this new technique, already well tried during the past fifteen years, and with the unfaltering conviction—that to disarm in the light of modern destructive inventions is the only form of security commensurate with world organization,—these are the goals to be achieved, as outlined by the World Federation of League of Nations Societies.

1. Destruction of all capital ships (over ten thousand tons).

2. Destruction or demilitarization of all military and naval bombing planes, as well as pursuit and fighter or combat planes.

3. Abolition of government-subsidized preparation for chemical warfare.

4. Destruction or demilitarization of all tanks and armored cars.

5. Destruction or demilitarization, as historic antiques, of all forts and fortifications, and the destruction, first of all guns over 105mm., then of all guns over 75mm.

6. Internationalization of civil and commercial aviation, on a world scale.

7. Rigid control and supervision, with drastic reductions in number and amount, following succeeding disarmament conferences, in

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| <i>a.</i> Standing armies | <i>f.</i> Aircraft carriers |
| <i>b.</i> Reserves | <i>g.</i> Submarines |
| <i>c.</i> Military training schools, | <i>h.</i> Budgetary control over ex- |
| public and private | penditures for wars to |
| <i>d.</i> Cruisers | come. |
| <i>e.</i> Destroyers | |

8. Rapid development of the Permanent Disarmament Commission, with wide powers of supervision, and publicity for control.

9. Rapid change in and development of a new type propaganda within the national states, leading to an understanding of one another, instead of spreading misunderstanding, mistrust, fear, and hate. Visible signs of such a government-inspired change must be seen and felt by 1935 as a beginning for greater improvement. This is one aspect of moral disarmament—the foundation for successful physical disarmament.

10. The recognition of the right to equality in arms as a step toward their revision downward, not upward.

11. Qualitative and quantitative disarmament to be recognized for revision of armaments downward, not upward.

12. Under the provisions of the Pact of Paris, a realization on the part of the signatories that there is no longer possibility of neutrality, military, economic, or political.

13. Increasing guarantees of security of a political nature within the League of Nations, strengthening its framework, must be given by sovereign states to each other for the safety of each.

14. All these provisions leading, for final effectiveness, to the universality of the League of Nations.

These are fourteen points for effective disarmament in view of the increasing contribution of science to the knowledge of mankind, convertible as well to the destruction of mankind.

These fourteen points, so drawn, are in the main in accord with the desires of the leading American delegate to the Conference for the reduction and limitation of armaments, Mr. Norman Davis who has consistently held for drastic reductions in armaments. In his speech at Geneva, he said—"As regards the level of armaments, we (the American delegation) are prepared to go as far as the other States in the way of reduction. We feel that the ultimate object should be to reduce armaments approximately to the level established by the peace treaties; that is, to bring armaments as soon as possible through successive stages down to the basis of domestic police force. In particular, as emphasized by President Roosevelt, we are prepared to join other nations in abolishing weapons of an aggressive character which not only are the more costly to conduct and maintain but at present are the most likely to lead to a breach of the peace." There speaks a statesman with a vision for the future.

Underlying these fourteen points are three main principles, governing the movement toward increasing disarmament which is, despite outward signs, gaining momentum with the years. These are the forces which, in the last analysis, control the progress of disarmament.

The first main principle governing disarmament is the use in war, regardless of commitments, of aërial bombardment and chemical warfare—poison gases and the like. We emphasize that the continued and uncontrollable expansion during peace time of aviation and of the chemical industry does not justify their use in war time. The definite fact holds, however, that if war is resorted to by the large industrial nations, the use of those tools of destruction most handy

for quick convertibility from peace to war uses, for as wide and as effective results as possible, is inevitable. Hence their use, regardless of international commitments to the contrary, is foredoomed.

Then, secondly, we emphasize as a fundamental principle in the problem of disarmament, the necessity (in view of the nature of modern warfare) of questioning the efficacy of most of the present forms of armaments. Where is the value of monster battleships, monster land guns, monster forts, monster tanks, enormous navies, large standing armies, if they cannot protect their homeland and their citizens from destruction? In view of the widespread and developing use of the products of the chemical industry, healthful in peace and efficient in war, in view of the widespread and developing use of civil and commercial aviation and its immediate convertibility into efficient war uses, in view of the increasing financial stringency in and between nations, the necessity for the drastic reduction of the older forms of armament is imperative. We have proven by statistics as well as by fact that such outmoded forms of armament cannot and do not protect the civilian from the deadly effectiveness of aerial warfare of today and the enlarged aerial warfare of the future.

For instance, the large battleship—that mastodon of the seas—is so unwieldly and inefficient that even Admiral Sims, of the American Navy, advises sending American battleships as far up the Mississippi as possible for safety in the event of war against the United States. Further, an English authority says:

“Consider one of the battleships built immediately prior to the ‘Nelson’—the ‘Iron Duke’—for example. She is armed with eight 15-inch guns. Her smaller guns are for her own defense and not for attacking the enemy.

“Nearly one-sixth of the whole weight of the vessel is absorbed in the weight of the guns, the huge revolving gun-houses in which

they are mounted, the complicated systems of built-up structure which carry the gun-houses, the hydraulic and electric machinery which works the guns, the ammunition which they fire, and the hundreds of auxiliary services and devices essential to the operation of those guns. These eight 15-inch guns with all that appertains to them weigh round about 4000 tons.

"Each of these guns can fire a shell of a little less than 2000 lb. Each shell leaves the gun at a velocity of about 2450 feet per second. Its velocity when it strikes the target is less, of course. Obviously its impact must be less in the vessel hit than in the vessel which fires the shell and which must absorb the recoil.

"Each shell may carry a bursting charge of, say, 160 lb. (In the German 15-inch shells the weight of the burster was only 148 lb. in the high-explosive shells. I have allowed a little more in the case of the British shells, in order to be on the safe side.)

"The weight of the propellant necessary to give the shell a muzzle velocity of 2450 feet per second will be approaching 480 lb. Hence, after burning 480 lb. of explosive in the breech of a gun, which with its proportion of gunhouse, etc., weighs 500 tons, after subjecting the ship in which the gun is carried to a shock which is felt from stem to stern, it is possible—if *the shell hits*—to achieve the magnificent result which would follow the bursting of a shell containing 160 lb. of explosive in or on the enemy vessel.

"The shell may hit, of course, and not pierce through the protection, for, like our own battleship designers, an enemy battleship expert would probably have devoted at least 8000 tons to the provision of armour, of thickness from 13 inches or so on the side to 3 or 4 inches on the decks, the purpose of which protection would be to keep the shell out. If it succeeded in doing that, the burst of the 160 lb. explosive would take place outside the ship and little harm would have been done.

"If the shell hits!

"But in the last war the percentage of hits to shells fired does not appear at any time to have exceeded 5 per cent. on either side.

"How does that affect our efficiency figures?

"It means that 9600 lb. of explosive will be burnt in the attacking battleship for every 160 lb. which detonates on the enemy vessel.

"Efficiency!

"I do not think one can reasonably ignore an analysis which indicates that 9600 lb. of explosives will be expended on a British battleship to ensure that 160 lb. explodes on an enemy vessel. And that proportion will not be reduced appreciably until something

extraordinary happens to the science and practice of naval gunnery.”¹

The same is true of American and Japanese battleships. They have reached the stage of overburdening size and consequent uselessness which the mastodon of old had reached, and which caused his disappearance. There is this difference between the overweening mastodon and the over-careering battleships. If politicians would evolve into statesmen, then battleships would vanish with the mastodon. Today, such outmoded political phrases as the freedom of the seas, mistress of the seas, still used in the international world, help to keep the battleship afloat. Does it matter to the politician that one battleship costs forty million dollars to build, that one bomb costing twelve hundred dollars could sink that mastodon of the seas? Does it much matter that to keep these battleships in order costs from one to two million dollars a year per battleship? The specious argument that such expenditures keep the naval yards going, keep some men busy who might be unemployed, can be met with the assertion that this is too high a price to pay for the increasing competition in armaments between nations which the continuing existence of the battleship commands.

Nevertheless both the United States and Great Britain insist on the retention of the large battleship—although it is true that no replacements will be made in this class before the London Treaty of 1930 comes up for reconsideration in 1935. If Japan insists at that time upon changing naval ratios to equalize the naval strengths of the three great naval powers, then the extended life of the useless battleship will continue as a burden to the tax-payer. Battleships are no longer weapons of warfare today—they are pawns in the political game.

¹ *Trans. of Inst. of Naval Architects*, Vol. lxiii, p. 18 (From E. F. Spanner, *Armaments and the Non-Combatant*, pp. 189–191), pub. by Williams & Norgate, Ltd.

Take land forts and fortifications. France has spent 19 milliard francs, according to the *Manchester Guardian*, within the last ten years in building up a string of forts along her eastern and southern frontiers. Will these forts, equipped with anti-aircraft guns, stop an invading horde of bombers flying at twenty to thirty thousand feet? Their ineffective shots will not reach, much less cripple these fast flying armored planes loaded with bombs up to four thousand pounds total weight. This is true of all land forts. Coincident with the building of these French forts occurred a notable expansion in the Italian aviation program, placing more emphasis on bombers and the inclusion of military features in tri-motor commercial and civil planes. Warfare has changed since the days of Verdun. Land fortifications are useless in a great emergency today, and only serve to stimulate hatreds between peoples and competition in air armaments.

Then the next general underlying principle of the disarmament program must be discussed: Are international conventions, protocols, and agreements mere scraps of paper? The sacredness of international agreements has two aspects. The point of view of the French and other Latin nations holds that, once an international agreement has been signed and ratified (and it takes a long time to make up the national mind to ratify it), it must be adhered to until the time limit set in the agreement is reached. The idea of the sacredness of the written contract in French law is here epitomized. The Anglo-Saxon point of view is that, when an international agreement is inapplicable, due to changed conditions, or varying interpretations, then the agreement itself must be changed. The mere facts that the English have no written constitution and that the Americans feel free to make frequent changes in their constitution, illustrate this Anglo-Saxon attitude of mind. These two opposing points

of view in regard to the sacredness of international commitments accounts in some measure for the very slow development of international law, and the readiness with which international agreements, once reached, are so often disregarded.

There is a middle ground between these two extremes which the nations, no matter how extreme their official stand on this subject, are being forced to take by the pressure of circumstances in the field of new armaments and in the field of international politics. This middle way is revisionism of those treaties which are recognized as no longer applicable. Revisionism has been and is now being practised in international law (to which all treaties on all subjects are contributory). Recognition of treaties by registration with the League of Nations (this is obligatory for all League members) does not prevent the necessity which often arises for their interpretation. Interpretation either by the World Court or by any other international body similarly constituted, involves often the reversal of a debatable point or the revision of phrasing in the light of recent events.

"And, of course, the whole body of new legislation is based upon the principle of change if not of progress. In fact the process of making law is not to be distinguished in principle from the remaking it, making new law from remaking or revising old; the process is all one. Not only do the external phenomena or juristic science but also the animating principles of juristic art declare for revisionism as a normal, fundamental, and inescapable practise."²

That this middle ground is being extended as actual practice in the application of the theory of revisionism develops a recognized technique, means much for the peace of the world and more for the gradual subsidence of friction between peoples. Thus the Latin versus the Anglo-Saxon point of view on international treaties is not irreconcilable, though

² From Pitman B. Potter, *Revision of Treaties*.

the differences appear on the surface great. One fundamental truth binds them together—the necessity for curbing international competition in armaments.

Twentieth Century Economics of Disarmament

Before we proceed any farther with twentieth century disarmament, one very important phase must be clearly analyzed. Without analysis, without comprehension, it might retard, if not ruin, this movement. The problem of unemployment, staring all heavily armed nations in the face, is of vital importance in this sufficiently economically deranged world. The economic side of disarmament is, then, as important, at the present moment, as the technical and political sides. No heavily armed nation can stand, from the economic point of view, the wiping out of the whole armaments industry immediately, or even within a year. Such a dislocation of labor, capital, and physical readjustments would represent a wrench of major importance, in the economic and financial life of the heavily armed nations. This violent solution of disarmament is not contemplated.

What is contemplated is a beginning, regardless of superficial economic disturbances, in the direction of financial and budgetary change whereby nations will direct less money and less concentration to methods of destruction and more money and more concentration to methods of construction. In this way there is no diminution in the economic life of a nation, no violent wrench causing more unemployment, but a change in the direction of expenditure, and reëmployment. This will entail a change in employment for those workers formerly employed in the armaments industries only insofar as those industries themselves cannot be converted into the manufacture of peace-time products.

The amount of dislocation to industry is a study of enormous proportions, impossible of inclusion here. How far

the steel industry will be affected, how far the coal industry, how far the small arms or machine gun industry, etc., etc., will be affected none can prophesy. That many of these industries, converted into the manufacture of other products, will receive the benefit of government orders for these products is obvious. For instance, the manufacturer of machine guns could employ practically all the same machine tools in the manufacture of motor cycle parts, receiving increased orders for his motor cycles from the greater demand for such articles throughout the nation as a whole if national security were assured. This adaptability to constructive uses of ammunition plants and factories for the manufacture of other war materials can and must be studied by industries likely to be affected by the unflinching disarmament program. There will be some—such as the manufacturers of heavy guns, the large navy yards and the towns built around them, which will suffer during the change. This period of transition through which the nations of the earth are passing from national independence and isolation into international organization and coöperation is a period of acute suffering in which none of us escapes.

The question of government-subsidized industries for war purposes is another angle, more difficult than private industry itself. For instance, the aircraft industry is dependent on government orders for bombers, pursuit, observation planes, amphibians, etc., etc., for its existence. There are many factories building civil and commercial planes but they, too, especially during this depression, have been hard pressed for existence and so have turned to some form of government orders to keep alive. Suppose all military aircraft are to be abolished, where would the aircraft industry be then? Smaller factories would have to go out of existence, a necessary weeding out would take place, and the industry would be put on a new basis of healthful production for healthful

needs. The government subsidies thus released would be turned into other channels of industry or, to speak plainly, into pockets other than those of the manufacturers of bombing planes. This economic readjustment due to disarmament must take place, sooner or later, and the excuse that we are passing through a major depression does not justify postponement of this program. The initiation of the disarmament program, starting now at a comparatively slow pace, gives to both the labor and capital involved in the change time to adjust themselves to new conditions, absorbs the soldiers and sailors into the new fields of employment opened by other government ventures, prevents any major economic wrench (how much more catastrophic to our economic system war is, we are witnessing right now), and stops that competition in armaments which leads so directly to another war.

What could be done with the money thus saved by governments?

Only three general fields, desperately needing attention, will be here indicated. Obviously a reduction in taxation to the individual taxpayer which, judging from what I read and hear in the various countries, would be most welcome. The answer that the reduction might be so slight as to be insignificant does not hold with the facts. The United States spends more than seventy cents of every taxable dollar on wars—past, present, and to come. Other nations hold a similar proportion—some more, some less. A reduction of such expenditures is in order.

Then, too, government support could be directed to other industries and projects of a lasting nature. Germany is undertaking a vast project for widening her automobile highways so that the automobile industry will be benefited and so that people will really move about and see other parts of the country and neighboring countries. Astonishing as

it may seem today, it is true that comparatively few people travel outside their national borders. This is wrong and must be changed. All of Europe needs similar development, and movement from one country to another will be greatly encouraged by the removal of passport restrictions and other travel barriers which now serve only the very questionable purposes of keeping nationals at home. Slum eradication and great improvement in housing for the small rent payer, public works of many kinds are crying aloud for attention. If only the discharged army and navy personnel could repeat in civilian life some of the triumphs of sanitation which have been accomplished under military orders, their usefulness to society would be clearly established and complaints against dismissal from army and navy stilled.

Finally, what a field of opportunity opens up for more and better schools, for more and better hospitals, for the development of child training, vocational guidance, for the whole field of social services which, neglected in proportion to the development of war and armaments, cries aloud for attention and development. The lot of the people must be improved, on a definite long-term plan, or else the result of continued neglect will soon be felt in more political upheavals. The peace-time development of the airplane opens up fields full of almost inexhaustible thrills and work. Those who have flown know the joys in store for the timid.

What country today is so perfect that the monies now devoted to the maintenance of the war machine and of armaments could not be now partially and then increasingly diverted to the challenging field of home improvements?

From an impartial statistician, the following figures were obtained. "The Great War cost about \$400,000,000,000. With that amount, if we had settled our international disputes by peaceful means, we could have built a \$2,500 house and furnished this house with \$1000 worth of furniture, and

placed it on five acres of land worth \$100 per acre and given all this to each and every family in the United States, Canada, Australia, England, Ireland, Wales, Scotland, Belgium, France, Germany, Russia too. After doing this there would have been enough money left to give each city of 20,000 inhabitants and more, in every one of the countries named, a \$5,000 library and a \$10,000,000 university. Out of the balance, we would have enough money to endow the salaries of 125,000 teachers and 125,000 nurses for all time to come. After having done all this, we would still have enough money left out of our war investment to buy every farm, home, factory, church, railroad, street car, store and product, everything which can be bought for money in all France and Belgium in 1914."

Other aspects of this many-faceted problem have not been touched. For instance, the exhaustion of national natural resources for war production would be stopped; in fact, the interesting question as to the grabbing of natural resources for war exploitation would open up fields for international coöperation barely dreamt of today. Japan never would have grabbed Manchuria as she did, violating her international commitments under the Pact of Paris and other commitments under the Covenant of the League if she had not realized keenly that her own iron ore, on her islands, was so rapidly decreasing under the combined pressure of her war and peace production program that within twenty-five years it would be completely exhausted. A nation moves fast and drastically when such an alternative faces her. Given a modified, rational, decreasing war program,—a nation can afford to take the slower and more permanent way of international coöperation for her economic needs.

For clarification, we repeat—the ceaseless improvements in aëronautics as applied to commercial, civil and military flying and the ceaseless improvements in chemistry as applied to

commercial, personal and military use are supplanting to an increasing degree the older forms of armaments, which are doomed because of their uselessness and expense. Within the nation, the rapidity of this change depends upon the rapidity of industrialization and the rapidity with which the old time militarists can be dispensed with. The economic argument that navy yards and munition plants give employment is fundamentally uneconomic and fallacious. It was the excessive destruction due to the war expansion of industry and munition plants which was one of the primal causes of the present world-wide economic collapse. To stimulate armament industries again for temporary economic relief from unemployment is directly leading to an intensification of the economic collapse within each such nation. For the steady production of destructive agencies invites their use (any diplomat or military trained person understands this). The invitation becomes an irresistible urge. War, today, as we have clearly proven, incurs such terrible national destruction, physically, mentally, morally, economically, financially that economic collapse, more serious than we are now experiencing, is guaranteed.

Where is the reasoning in this short-sighted policy of putting men to work to increase navies, armies and the military air arm? Would that some statesman with courage and initiative could publicly announce that his country's policies do not include such expansion in navies, armies or air warfare preparation; that his country is going to see this economic challenge through on a constructive long range basis, not on a destructive, short range tactics. The increasing competition in armaments which is visible today to an alarming degree, is uneconomic from every angle, unwise from every angle, unsecure from every angle and vicious in its all involving circles of destruction. Twentieth century disarmament would stop all that.

Modern Psychology for Disarmament

If the knowledge of the alternative facing civilized nations today, should war be resorted to on a large scale, could be brought to the attention of all peoples in clear, truthful language; if the development of moral disarmament might be speeded up through the education of both youths and adults in all lands; then this wide discrepancy in the attitudes toward international agreements, duly signed and ratified, will tend to be eliminated, and national attitudes will move toward a common basis of understanding.

How can all this be applied to twentieth century disarmament? Gradual, drastic disarmament can be successfully obtained only when the respect for international agreements, arrived at by mutual compromise of all nations concerned, leads to obedience by those nations to binding restrictions. It is too much to expect or require that immediate, total, universal disarmament can be achieved by one grand gesture. Until world organization is evolved and perfected to take the place of armaments as security it will be necessary to hold diminishing armaments in check by universal international agreements against all war and the use of force. As soon as all nations are willing and ready to enter into such a world organization, then the Soviet proposal for total abolition of all national armaments put forth again too soon in February, 1932, can be accepted by all nations.

The plea that large navies and large armies act as police forces, helping to keep the peace, is decidedly fallacious. So often one hears from worthy admirals, "The navy is a peaceful institution. Warships in foreign harbors terrify the inhabitants and so we keep the peace. Training on board ship makes finer citizens, for they travel and are trained at the same time."

As for the army and navy being agents for the educa-

tion of the doughboy, the tommy, the poilu, and all the others, there are forms of education more easily available and at less expense, which adapt students to economic and social conditions that prevail in the normal world of men rather than to the artificial set of conditions found in the army and navy. This plea of the educational value of the army and navy is the acme of inefficiency. Warships in foreign harbors are today an incentive to develop armaments in subject nations.

There is one more consideration to be added to the fundamental principles which we have already discussed in this general survey of factors governing drastic disarmament, namely the use of aerial chemical warfare in time of crisis regardless of international commitments, the necessity for and the value of international commitments, the inefficiency of present forms and types of armaments in view of the development of aviation and chemistry. This further consideration deals with one aspect of psychology: the reliance upon a show of force for the furtherance of one's demands, whether personal, national, or international. Volumes could be written on this all-engrossing subject. The man that bellows at committee meetings must be right; the nation that bellows, bullies, insinuates, and threatens at international gatherings must be right; the group of nations that bellow, threaten, bully, or insinuate, must be right. It is a human failing that we associate authority with noise, and noise with authority. In truth, it is often the quiet person with a short, quiet remark who hits the mark with his or her observation; it is often the small nation which takes a quiet, courageous stand for the best international principles. As soon as we and our children learn that vast truths come from other sources than those most advertised, we shall be able to reevaluate our human relations.

For minority groups within the nations this doctrine is

very difficult of acceptance. Often the minority attitude, when the majority rules and succeeds in imposing its wishes by force, is: why not emulate them and perpetuate this example when the tables are turned (as they so often are in the course of history)? Labor groups feel this strongly when wages and the conditions of labor are slow in improving; racial and linguistic minorities feel this strongly during their periods of oppression; individuals used to feel this strongly when serfdom was the law of the land. If reliance on force to gain the national demands is continued, how can we disarm?

In view of this fact in human nature, our progress in disarmament can proceed only as our progress in genuine education for human betterment and human brotherhood progresses, with effective international organization. Just as law was substituted for force between individuals, just so must law be substituted between nations for the final, just settlement of their disputes. Just as strong individuals are held in check by the force of law and public opinion from overriding weaker or quieter individuals, just so can the strong nations be held in check. This has already happened time and time again in Geneva. It is the beginning of a deeper process of mobilizing public opinion for international coöperation, and of education among the peoples which will, in the end, guarantee the success of controlling erring nations.

Thus, slowly, as nations disarm, force gives way, in the search for the best means of obtaining demands, to coöperation. As nations take in this lesson, so will minorities. Each will have his day in court for the final adjudication and recognition of his demands. This is not utopian. This is what is happening under our very eyes. Despite the seeming omnipotence of some governments in some countries, these powers are nevertheless brought to terms and to task by the super-power

of international authority, acting for the best good of all nations. Such historical examples, during the last ten years particularly, occur to every thinking person, a revelation, if summed up, of the force of right overcoming the force of might. However, the last stand for militarism, the force of might, will be gruelling, determined, though in the end it will be conquered. Despite the seeming oppression within national borders, these powers are so sensitive to international opinion and so quick to watch the falling barometer of international trade that retrenchments and adjustments are made without the show of armed force. I have seen the haughty delegates of disdaining, sovereign nations turn pale as they were laughed to scorn for their truculence before an international gathering of delegates, press, and public at Geneva. I have watched them as they quickly telegraphed or radioed the news back home, begging for new instructions. This is barely the beginning in the use of a new force, public opinion, more powerful than the show of arms, more lasting in its constructive effects than the terrible, wasteful destruction of combatants, non-combatants, and all civilization within the area of combat.

When we have harnessed and trained this new force through the main channel of the League of Nations, then final, total disarmament can and will arrive. It is coming more quickly than we now suppose, for the fundamental forces in producing disarmament are effectively at work,—irresistible and immovable.

Summary

The victor nations of the World War, instead of living up to their pledges under the Covenant of the League and the Versailles Treaty, have increased their armaments to an alarming degree in their age-old search for security. Despite limitation and reduction of armaments conferences held

since the end of the World War, the competition in many types of armament has increased instead of decreasing. The major nations, armed to the teeth, possessing huge national deficits, are entering a new era of competitive armaments. The reasons for this reversal of the peoples' desires after the horrendous tragedy of the World War are numerous and complicated. Suffice it to say that a wave of nationalism, a deep-seated but not ineradicable sentiment which the French have expressed as *sauf qui peut* has forced each nation to try one more futile attempt to go it alone economically, financially, and with rising armaments politically, despite an incapacitated League.

But, these are different days and times from 1914-1918. There are new forces at play today that were barely dreamt of in those days. The growing influence of the far-cruising airplane is just beginning to make its mark felt on the thinking of the peoples and the actions of the nations. Again, the mobilization of industry for war purposes has a new aspect whose sinister implications are barely conceived of at present. The war of the future is a war of industrialized giants, bending every energy at home and at the front to overcome another industrialized giant. The chemical industry stands ever ready with peace-time products quickly converted into war products such as poison gases, etc. With the aid of the war planes and the commercial planes, whose trained pilots are immediately pressed into military service, these chemical products are carried to the enemies' rear—the great industrial centers where the millions in population live, who are bending every energy to further the war and therefore are legitimate targets for the bombing planes. With the constant increase in new death-dealing inventions which the airplane can and does carry—civilization within the war area is to be wiped out.

These are the facts concerning modern warfare. Each

major nation has a promising air force in civil and commercial aviation and a chemical industry artificially protected by high tariff walls. Granted, as we now must, the immediate conversion of these peace-time industries into powerful war industries, what effect should this incontrovertible fact have on the increasing armaments which we see about us today? The reduction of armaments to a national police force and the abolition of all weapons of an aggressive character are justifiable moves on the part of the nations most heavily armed because these are the nations whose peace-time industries—especially aviation and chemistry—are ever-ready for war conversion. There is no loss of security for any nation if such a move toward drastic disarmament would be genuinely made. This would be a beginning toward further steps, depending on the development of constructive peace machinery able to settle disputes between nations by the conference table method.

Conclusion—In thus advocating drastic reduction of the aggressive types of armaments (the definition of aggressive types has been reached at this first Disarmament Conference), no diminution in the sense of security for the nations occurs. What does happen is a removal of the dangerous race in arms competition, which, as we have seen time and time again throughout all history, leads to war. In advocating a police force for each nation for its national security, the convertibility of peace-time industry into war industry is definitely taken into account—meaning civil and commercial planes and the chemical industry. No matter what happens in this troublous world, the continued development of these two crucial industries is guaranteed. They meet the growing intense needs of the machine age. This insistence on their ready convertibility does not condone or approve this convertibility. It simply states a well-known fact—that a nation hard-pressed for its national existence by invasion or the

attacks of an aggressor nation, uses, regardless of international commitments to the contrary, the most effective weapons for mass destruction. Aviation and poison gas are ideal for this purpose. Twentieth century disarmament takes into consideration this ever-present threat to the existence of the state and says, in view of this fact, drastically reduce the outmoded forms and types of armaments and then find in international coöperation, the security which cannot be found in armaments competition.



PART IV

THE ANSWER TO THE CHALLENGE



CHAPTER I

SECURITY FOR TWENTIETH CENTURY DISARMAMENT

IMMEDIATELY from the point of view of Europe, increasingly from the point of view of the Western Hemisphere, inevitably, in the end, from the point of view of the Far East, the adjustment of international disputes will have to be made by other means than war, or the use of armed force. The implications of this conclusion, based on the uncontrollable development of modern methods of warfare, are being studied today from every angle of human activity, for every aspect of human interest is deeply and permanently affected by this momentous change. The reaction of this conclusion on the problem of security is our immediate interest.

There are, in the final analysis, two kinds of security: the one, natural security, that which is afforded by nature herself. Such natural barriers as mountain chains, oceans, rivers, formed in the olden days barriers behind which the fortunate nation felt secure from swift attack. Such natural barriers are falling before new methods of transportation. No longer is England secure behind her channel, for the airplane binds her to the continent by a seventy-minute flight. No longer is the United States isolated from Europe, for the airplane can reach her within fifteen hours from the European continent. Natural barriers may be convenient to delineate boundaries, but as barriers for security they are becoming increasingly non-existent. This is exceedingly impor-

tant because it levels all nations to a basis of equality when security for all is being planned. The other form of security is artificial—built up by contacts between nations.

Short Résumé of the Progress of Security before and since the World War

It is an interesting and significant fact that the question of universal security has arisen and its solution developed only since the World War. Before that time, nations relied on their own armies and navies for national security, or relied on a system of alliances and ententes to establish a balance of power which was to bring the needed protection. This development is true especially of European politics. In reviewing European history from the point of view of evolving security, three stages seem to stand out clearly on this rocky road. As a logical successor to the medieval policy of mutilation of captured individuals (Genghis Khan caused the right hand of every captured male between the ages of twelve and thirty to be cut off), there developed the policy of devastation, ruining the area of a captured country so that reconstruction would be delayed. Then came a policy of encirclement, the creating of buffer states between potential enemies and the formation of alliances with neighboring states, if possible, to surround the possible aggressor. Then the policy of guarantee whereby, for instance, the security and neutrality of Belgium and Switzerland were guaranteed. In his excellent book, "The Problem of Security," Mr. Wheeler Bennett holds that these two latter phases were simultaneously extant until 1925 when, with the Locarno agreements, and later the Kellogg-Briand Pact, a new force in security was manifested,—the policy of mutual guarantee. In the telling phrase of Garnett, there was pledged "the strength of all for the safety of each."

Since the war, then, the history of the search for security

is not only the history of the Versailles Treaty (to which the League of Nations is, unfortunately, bound), but also the history of the development of treaties for neutrality, non-aggression, outlawry of war, etc., which have strengthened the structure of the League by extra-League support. In discussing the problem of security in this book, we are rigidly holding to the main thesis: how much security for how much disarmament in the light of modern methods of warfare, air warfare of today. Every other aspect of the manifold problem of security (and there are many other important aspects) is here excluded as extraneous to this thesis. Again, the field of security will be narrowed to the question of how far treaties have gone and international organization has developed to meet the main threat to disarmament and peace today—the adjustment of territorial disputes by peaceful methods, and not by resort to war. Herein lies the kernel to the final abolition of all warfare, offensive as well as defensive.

Sovereignty, Security, and the Transfer of Territory

When the treaty of peace came to be drawn up, France, invaded twice within fifty years by her neighbor, Germany, made demands for her security and received territorial recompense in Africa, Syria, etc., reparations recompense, the disarmament of Germany, the return of Alsace-Lorraine, Anglo-American treaties of guaranty of protection if France were to be invaded again, and Allied occupation of the left bank of the Rhine for a period of fifteen years (which was measurably shortened). The Anglo-American treaties of guaranty failed of acceptance, first, by the United States and, consequently, by Great Britain, so that French policy since then has consistently been directed toward more security for herself. Since the United States is one of the important nations not a member of the League of Nations,

France, uncertain of our possible acts as neutrals, feels that the guarantees of the League Covenant are not sufficient to protect her against another invasion. Hence her increasing armaments. Thus are security and armaments quite inseparably intertwined. Germany, disarmed by the treaty, feels herself surrounded by the bristling guns and forts of the ten neighbors touching her borders. She emphasizes and magnifies this fear by exhibits, maps, remnants of war glory, which the German people are forced to study with zeal. So, as a result of the Versailles Treaty, with its contentious disposition of European territory, and its arbitrary disposition of mandates and colonies, the lack of security, the lack of trust between nations has been measured in direct proportion as armaments have grown. France, one of the two or three most highly armed powers in the world, feels insecure still. Germany, the most completely disarmed power, feels insecure. Thus has grown up a French thesis for security of territory and, at the opposite end, a German thesis—as far apart in starting points as the poles—alike, however, in their common insistence that might, force, armaments, men under arms, bring security.

How has the League of Nations Covenant met this challenge? Under Article X there is a mutual guarantee of all nations to respect the territorial integrity of each nation. Obnoxious as this article is to some Americans who built up their opposition to the whole League on the basis of this point, it nevertheless opposes, for the first time in history, the old system of territorial security by encirclement and the threat of devastation by means of a new system of mutual guarantee. Article X reads:

“The Members of the League undertake to respect and preserve as against external aggression the territorial integrity and existing political independence of all Members of the League. In case of any such aggression, or in case of any threat or danger of such

aggression, the Council shall advise upon the means by which this obligation shall be fulfilled."

In this article, all the new nations of Europe, Czechoslovakia, Poland, enlarged Roumania, Jugoslavia, Albania, the Polish Corridor, the Free City of Danzig, Lithuania, Latvia, Estonia—find their sheet anchor for safety. This is the League's guarantee that the member states shall have security. The only possibility for changing these boundaries by peaceful means as envisioned by the League Covenant is found in Article 19, which specially empowers the Assembly of the League "to advise the reconsideration of treaties which have become inapplicable." This article, then, sees the League acting only in an advisory capacity in such matters.

Here is one of the serious defects of the League of Nations. No actual procedure was presented for the transfer of territory from one sovereignty to another, with the consent of all concerned, by peaceful means. It sounds like Utopia to suppose that, for instance, the problem of the Polish Corridor (that small stretch of territory giving Poland access to the Baltic Sea, but cutting Germany off from one of her important provinces—East Prussia) could be adjusted to meet the needs of Poland and the wishes of Germany—without another war. It can be done, and would have been done long since, if there had been established a method for peaceful transfer within the League. It must be adjusted peaceably if both Poland and Germany desire to continue their existence. Until such time as this necessary amendment to the League Covenant shall have been adopted (and pray God that the nations will soon see their way clear to such an amendment, before it is too late), treaties for arbitration of disputes outside the League machinery have been and are being made in great numbers.¹

¹ Consult *General Synopsis of All Treaties*, by Francis Colt de Wolf, published by the Carnegie Endowment.

Treaties toward This End

Security by arbitration for disarmament has developed a world-wide network of treaties. These treaties can be summed up thus:

1. Bilateral alliance directed against a Power from whom aggression is anticipated. (The most important instance of such an alliance now in force is the Polish-Roumanian Alliance originally directed at once against Germany and Russia.)

2. Bilateral treaty of permanent neutrality such as those initiated by the Soviet Government with Germany and Turkey.

3. Alliance between two or more Powers to preserve the *status quo*, created by a general peace settlement. The formation of the Little Entente and the treaties between its states and France and Italy are examples of this, as is also the guarantee contained in the Straits Convention.

4. A series of treaties between states situated in a certain area, calculated to ensure the general security of that area. The Turkish treaties with France, Persia, and Iraq are illustrative of this method.

5. An agreement between two or more Powers to guarantee the territorial integrity of a third party during a period of economic or financial reconstruction. Such are the Austrian and Hungarian Reconstruction Protocols and the Chinese Non-Aggression Pact (or Nine-Power Treaty) signed at Washington.

6. A direct agreement between the Powers concerned to respect mutually the integrity of their possessions in one specified area. The Four Power Pacific Pact is the only example of this.

7. A pact between two or more contiguous Powers to respect their mutual frontier and the participation in such a pact of other Powers, not necessarily contiguous, as guarantors, all agreeing to support any signatory state which is the subject of an act of aggression on the part of another signatory state. The Locarno Treaty of Mutual Guarantee is, of course, the classic instance of this type, but its principles are likely to be the basis of any security pact which may be concluded in the future.

8. A general international agreement under which all contracting states are automatically at war with an aggressor state. This principle was the foundation upon which the Treaty of Mutual Assistance and the ill-fated Geneva Protocol were based.²

Actually, treaties of the sort so quickly summarized above by their general tendencies, mount up into the hundreds, and

² From Wheeler-Bennett, *The Problem of Security*.

are to be regarded as the flying buttresses of the Gothic temple of the Covenant. There are, for instance, fifty-six nations members of the League of Nations (leaving six nations non-members). There are forty-seven members of the Permanent Court of International Justice. There are forty nations which are bound by the Optional Clause of the Permanent Court of International Justice, making the decisions of the Court binding upon the litigants. There are fifty-nine states bound by the Pact of Paris, which outlaws all wars of aggression. There are nineteen states parties to the General Act of 1928, for the arbitration of all disputes. Regional agreements of security for the pacific settlement of international disputes include the Locarno treaties, signed at Locarno in 1925 by seven powerful European states, aligning these Powers of Western Europe behind an international order which has as its central principle the understanding that the position in which Germany was placed at Versailles shall not be altered by force, but that it shall be altered by diplomatic negotiation. Other regional agreements, such as the treaties for the establishment of international commissions of inquiry between the United States and the Central American republics; treaties to avoid or prevent conflicts between the American nations of 1923, including seventeen of the twenty-one Latin American republics; the treaty relating to the dominions in the Pacific, or Four Power Pact of the Pacific area,—all these have been ratified. These regional agreements (of which only a few are here cited) are developing a technique and psychology of regional initiative which is directly beneficial to the development of security of those nations involved. The Four Power Pact initialed by France, Germany, Great Britain, and Italy hopes to provide peace in Europe for ten years.

The Pact of Paris, to which all nations (except Argentina, Bolivia, Brazil, Ecuador, San Salvador, and Uruguay) are

signatories (thus including the seven nations not members of the League; neither Brazil nor San Salvador are bound by either the Pact or the Covenant), represents a great step forward in the peaceful relations between nations, particularly after the joint statement of President Hoover and Mr. Ramsay MacDonald in 1929,

"Both our Governments resolve to accept the Peace Pact not only as a declaration of good intentions, but as a positive obligation to direct national policy in accordance with its pledge."

In this rather general list of treaties and tendencies, various important points must be stressed. The development of treaties of arbitration among the Western European states was their contribution to security and territorial adjustment. Soviet Russia emphasized treaties of neutrality and non-aggression, and has been the initiator, in her treaties of non-aggression with the Balkan states, signed in July, 1933, in using the definition of an aggressor nation. This definition, which is significant enough to quote, forms Article 6 of the European security pact suggested in the Draft Disarmament Convention submitted by the United Kingdom delegation and agreed to by the other nations which were members of the same commission. It is as follows:

- "A state shall be declared the aggressor if it shall be the first to
1. Publish a declaration of war against another country;
 2. Undertake an invasion, using either land, naval, or air forces, without a declaration of war, against the land, naval, or air forces of another country;
 3. Commence a blockade against the coast or ports of another country;
 4. Give assistance to an armed band which, formed on its territory, starts an invasion of the territory of another country or which eventually will refuse, despite the demand of the attacked country, to take on its own territory all the measures which it is capable of taking to deprive these bands of all the assistance or defense."

This is the first time that the definition of an aggressor has been accepted in international law and thus the ring begins to grow tighter around the giant—war.

However, the transformation within and between nations cannot be made immediately. France still holds her entente cordiale with Poland and the Little Entente, while Italy keeps a firm grip on Albania, watches Jugoslavia, and prefers to discourage any movement toward an Austrian Anschluss with Germany. The inter-play, above board and under the board, of national interests and international desires, is so over-lapping that no clear distinction can be drawn as to specified spheres of interest. It is clearly a cleavage between those European states interested in retaining the status quo of the Treaty of Versailles and those most desirous of changing this treaty and its territorial arrangements.

Here are the two camps facing each other in Europe today, seriously imperilling the peace based on the territorial arrangements of the Treaty of Versailles. To go to war again to try another adjustment is inviting annihilation. That is clear from the presentation of facts in regard to modern warfare. In a speech of May 17, 1933, Chancellor Hitler recognizes this,

"No new European war could replace the present unsatisfactory conditions with something better. On the contrary . . . new wars, new sacrifices, new uncertainties, new economic distress would result. The eruption of such insanity without end, however, would lead to the collapse of the present order of society and states. A Europe sinking into communistic chaos would invoke a crisis in the world's development of unpredictable proportions and length."

As a result of this statement and the feeling which underlies it, various significant moves have been made by the American Government in coöperation with other governments for the

development of security and the insistence that the transfer of territory by illegal means (war or force) shall not be recognized.

Changing Attitude of the United States toward the Forcible Transfer of Territory Contrary to the Pact of Paris

First, in January, 1932, the United States notified China and Japan that it would not recognize any situation, treaty, or agreement which might be brought about by means contrary to the covenant and obligations of the Pact of Paris. This stand was later corroborated and reinforced by a joint declaration, in the form of a resolution binding on the member nations, of the Assembly of the League of Nations on March 11, 1932, that

"It is incumbent upon the members of the League of Nations not to recognize any situation, treaty, or agreement which may be brought about by means contrary to the Covenant of the League of Nations or to the Pact of Paris."

In February, 1932, Secretary of State Henry L. Stimson wrote in an open letter to Senator Borah, then chairman of the Senate Committee on Foreign Relations, the interpretation of this joint statement to include a willingness to consult with other signatories of the Pact of Paris in case of any proven violation of the Pact, as well as a refusal to recognize the transfer of territory contrary to its provisions. The two American party platforms, Republican and Democratic, in June, 1932, carried a statement that the respective parties agreed to the plan to consult with other nations under the provisions of the Pact, and on August 8, 1932, Secretary Stimson said,

"Another consequence which follows this development of the Briand-Kellogg Treaty, which I have been describing, is that consultation between the signatories of the Pact when faced with the threat of its violation becomes inevitable."

Upon a second declaration of the League Assembly after the receipt of the report of the Lytton Commission on Manchuria, the note of the United States recognized that this joint stand of the League of Nations and the United States in refusing to recognize the transfer of territory by violence, brings them both on common ground. Furthermore, the incoming Secretary of State, Mr. Hull, sent an accredited American member to the League's Advisory Commission on the Far Eastern dispute, Mr. Hugh Wilson. This commission completed and adopted a report on the application of policy of refusal to recognize such transfer of territory by violence, which was sent to all nations. Thus questioned, the status of Manchukuo has led to close collaboration between the United States and the League in the development of a policy of non-recognition which has a definite bearing on any future illegal transfer. This is an important first step in strengthening League procedure and constitution after the serious shock of war between two members of the League. With the clarification of methods of consultation which has still to come (for Soviet Russia and Japan, both Pact signatories, have to be placated), another chapter in the development of technique for the peaceful transfer of territory will have been written which will react directly and favorably on disarmament. The work continues.

In the spring of 1933, Mr. Norman Davis, American delegate to the Disarmament Conference, asserted that it was inherent in the Pact, and so recognized by the Government of the United States, that consultation between the signatories of the Pact, when faced with the threat of its violation, becomes inevitable. Furthermore, in the event of war, decision having been reached, the United States shall not interfere, intervene, or exercise its rights as a neutral if it (the United States) agrees with the decision; a purely negative stand, but nevertheless very valuable in clearing the atmos-

phere of misconceptions. Now the League knows that, whatever decision it reaches by unanimous vote of its members against an aggressor nation, its moves will not be balked by the interference of the powerful United States on the grounds of the latter's neutrality. The obligation to consult under the provisions of the Pact of Paris would, it seems, be obligatory to all signatories as it is implied in the Pact. The quickest method of calling the nations together or their delegates for such consultation is through the mechanism already functioning, that is the League of Nations' Council. Hence, coöperation with the League is imperative for the settlement of disputes between nations, whether members or non-members of the League. The net-work extends to all nations either through the Covenant of the League or through the Pact of Paris. This was definitely demonstrated during the Sino-Japanese crisis when an American delegate sat with the Council of the League under the provisions of the Pact of Paris. Thus, within and without the League, the network of treaties tightens the political cord between the nations.

This concentrated history of the development of treaties within and without the League has had for its aim an emphasis, for those who are doubters, on the continually enlarging sphere of peaceful adjustment of disputes between nations. Underlying these treaties, two mutually antagonistic forces are at work in Europe: the one holding for the status quo as declared by the Treaty of Versailles and the other demanding the revision of the territorial arrangements of that treaty. These two forces are represented primarily by two groups of European nations. Non-revisionists are France, Czechoslovakia, Poland, Jugoslavia, Roumania. Those nations which demand revision are primarily Germany, Italy, Hungary, Austria. Obviously those nations which benefited from the treaty in territorial possessions want the status quo;

those who were deprived of territory or want more (Italy, for instance) want a change.

So the question of the peaceful revision of treaties is directly bound up with the question of disarmament.

"A statesmanlike movement to abolish war must seek at once to strengthen the unity of the powers in defense of the status quo, and, at the same time, to enlighten that defense by persuading the powers that the true defense of their interests may mean, not resistance to all change, but a hospitable guidance of changes that sooner or later are inevitable."⁸

Three Methods Developed for the Peaceful Transfer of Territory

Such hospitable guidance to territorial changes have occurred since 1919 in three remarkable ways. First, the policy of freezing frontiers as they were constituted by the Treaty of Versailles and only changing these boundaries by peaceful means is reinforced by the Soviet pacts of non-aggression, not only with her Baltic neighbors, but also with such neighbors as Poland and Roumania, to whom was given the former Russian territory of Bessarabia. France has signed a non-aggression pact with Russia. This emphasizes the importance of the next development—a means of peaceful transference of territory from one sovereignty to another. Such instances are already on record since the World War. Secondly, the World Court, by decision in the case between Norway and Denmark, quietly adjusted the question of the sovereignty of Greenland, claimed by both Norway and Denmark, by assignment to Denmark. The Norwegians thereupon withdrew their troops. The nations which were the disputants in this case were so outstanding and so far-sighted as to abide by this decision without any appeal either to outraged national feelings or to arms. This is significant and gives an example for future adjudications between na-

⁸ From Walter Lippmann, *The Political Equivalent of War*.

tions as well as enlarging the scope and power of the World Court.

Thirdly, under auspices of the League of Nations, territory has been handed back and forth, in one case showing how to do it and in another how not to do it.

For instance, Britain, holding a mandate for Iraq, gave Iraq her freedom as a mandated area, and promoted the movement for the membership of the independent state of Iraq in the League of Nations, which was consummated in 1931. Again, an example has been set for other nations to follow—an example without recourse to arms. This may lead the way for other Class A mandates to obtain their independence. In passing, I cannot resist from noting, again as a support to the general thesis of this book, that Great Britain retains, in this transfer of territory, aërial control over Iraq and so aërial freedom for free aërial access to India. Then, under League auspices, only insofar as both disputants are members of the League, the independence of Manchuria points the way how not to go about changing the status of territory. However, in passing, it is important to note, in this sad state of affairs in the Far East, that Japan has not only incurred the moral disapproval of the united western world, which "has a significance hitherto unknown in international law" (Honorable Henry L. Stimson, in his address before the Council on Foreign Relations in August, 1932), but has also had herself declared the aggressor nation by the united action of the western nations, on the basis of action and definition.

This joint action is significant for the evolution of world organization and for the eventual isolation of the aggressor nation, economically as well as morally. What reaction such condemnation may have on the progress of disarmament it is hard as yet to tell. If Japan refuses to abide by the disarmament convention, the solidified moral disapproval of

the western nations may be forced into channels for the united imposition of sanctions, leading to a capitulation by one outstanding recalcitrant nation. How often one hears, "The next war will be in the Pacific." Beware of wish fulfillments, say the psychologists. If the nations desire it and prepare for it, it may come to pass. The peoples—are they ready to be cannon fodder or gas victims for an old-fashioned shibboleth, "War makes right"? In view of the constant development of aviation and modern methods of war, the lot of a nation which refuses to abide by her international commitments and is consequently declared the aggressor nation is not enviable. This moral condemnation of a nation's actions by the public opinion of the world, backed up by a slowly evolving use of varied forms of sanctions (boycotts, the press, etc.), applies to any nation that runs amuck outside of her own national boundaries. In the crowded centers of Europe this is more keenly and quickly felt. In the Far East it is growing more evident. Every dispute existing now between nations can be settled constructively and definitely by existing peace machinery. Only the will to make that machinery work effectively, is lacking.

A World Organization with Sanctions for Security

The problem of the effective imposition of sanctions, as Japan well knows, is absolutely bound up with joint action of all nations against the declared aggressor. This joint action can be achieved today only with the greatest difficulty, because all nations are not members of, nor bound by, the League of Nations. For nations which are members of the League, there is Article 16 of the Covenant, which says, in paragraph 1:

"Should any member of the League resort to war in disregard of its commitments under Article 11, 13, or 15," (Japan has disregarded the provisions in these articles by League pronounce-

ment) "it shall ipso facto be deemed to have committed an act of war against all the other members of the League, which hereby undertake immediately to subject it to the severance of all trade or financial relations, the prohibition of all intercourse between the nationals and the nationals of the covenant-breaking state, and the prevention of all financial, commercial, or personal intercourse between the nationals," etc., etc.

Why did not this stop Japan? Because, when it was written in 1918, it was supposed that the United States would become a member of the League. When the United States refused to join, the whole ineffectiveness of this plan for joint boycott became clear. No boycott of any kind can be effective unless it is universal, involving joint action. The United States to date has arrived at the stage which we have above noted: it has agreed to consult with the other signatories of the Pact of Paris if a signatory, by the definition of an aggressor nation, has violated that pact, which outlaws wars of aggression. Then, too, the United States has said that its Government will not interfere with any joint action as a result of that consultation and, of course, it is in no way bound to enter into that joint action. In other words, the rights of a neutral—particularly the right to trade with the combatants on both sides of a struggle—have been given up. Progressive as this step seems, it is really of but passing help. For Great Britain is then assured that there will be no conflict between the two powerful fleets in regard to this joint action, and hence Article 16 of the Covenant can be invoked by the League's member states. These steps in the imposition of sanctions which can be applied gradually to the aggressor nation are as follows: joint recall of consular and diplomatic officers; joint commercial, financial, and general economic rupture, either through a customs blockade (stopping exports en route to the aggressor) or through an embargo on all other countries' imports from the aggressor nation, or—most drastic of all—a direct

blockade of the enemy ports by naval action such as Great Britain enforced on Germany during the war. If there were still a refusal to recognize obligations legally incurred under international treaties, joint military action might be invoked as a last resort. Any or all of these steps in the imposition of sanctions on a recalcitrant nation might be stopped as soon as tangible evidence might be given of a willingness on the part of the law-breaking nation to become law-abiding. The whole question of sanctions has another side which can only be indicated here—the moral side. This aspect lies beyond our immediate subject. But it should be clearly indicated that if international engagements are to be signed in good faith and ratified by the parliaments of each sovereign nation and then disregarded when convenient, stronger measures are imperative which will instil respect for international law. Individuals within the nation are restrained in like manner. Aggregates of individuals—the nation itself—can be restrained in some cases by sanctions. Joint sanctions under the auspices of a universal League of Nations would operate as a moral police force, the threat of whose imposition will give international law universal respect. Then security and the peaceful transfer of territory become more possible.

Adjustment of Colonial Territory and Security

One other aspect of the peaceful transfer of territory or the revision of treaties for such transfer should be explored in its relation to modern methods of warfare, and to the problems of security and disarmament. Within the British Empire there has occurred in these post-war years a revolution of major importance in the relation of Great Britain herself to the Dominions, within the Empire framework, without the show of force. A measure of developing independence has been granted which, as in the case of Ireland,

has sometimes practically amounted to complete independence. The importance to our study is the fact that, in these quiet changes, each such change has been adjusted to the needs and wishes of the immediate parties concerned. The final status of India is being slowly forged by the iron determination to find a peaceful solution, without revolution. A movability and adjustability within the structure of the slowly evolving Empire have been achieved which sets a much-needed example to the final adjustments, likewise without force, of the status of each of the Class B and C mandates within the League.

This brings the discussion of the relation of security and disarmament directly to the problem of colonial empires—a problem which can only be indicated in the briefest outlines here. Political measures leading to the eventual release of these mandated territories into the world organization are retarded by such general factors in the final decision as the degree of political evolution within the state itself, the degree of religious fanaticism which leads to internecine wars and disturbances, the degree of geographical influence on the population (for example, more soldiers are needed for the mandated areas in the more temperate zones than in the tropics because the climate in the tropics is enervating to military uprisings). These general principles have guided the three great European colonial powers,—Great Britain, France, and Holland,—as well as the United States, in their treatment of the native population and the numbers of the military or naval forces stationed in their respective colonial areas. It is interesting to note that the Locarno treaties imply the adjustment of disputed European territory by joint guarantee against an aggressor nation. However, except for Article 10, there is no similar guarantee for territory outside the continent of Europe. This has a significant bearing on the large colonial military forces which each colonial power finds necessary now, and is one

of the many impediments in the way of the reduction of military effectives. Great Britain and France follow opposite policies in their programs for colonial forces. The first continually sends to her colonies her army strength in enlisted men and officers, keeping a skeleton force at home, achieving an interchange back and forth between the homeland and the colonies which is healthy experience for the army men. Great Britain relies, then, because she is an island power, on her navy for home security. France holds a large army (about 400,000 men) in the homeland because she is a mainland power fearing land attack, and relies on colonial troops, officered by white French officers, for the main defense overseas. It is an interesting difference in the psychology of security which will afford valuable data for a final disposition of those areas of the world's surface which will need supervision for the maintenance of order for long years to come.

The seething unrest of the Far East brings dismay to the proponents of drastic and rapid disarmament by the leading Powers. There is the long, bloody revolution in China which is continually stirring up latent forces of disorder in a country in which strife, once stirred up, takes on sinister forms and sinister reactions throughout the whole Far East. There is the panislamic agitation among the Mohammedans of India, the Dutch East Indies, Malaysia, and the Philippines. There is the communistic agitation and propaganda throughout Asia. There is the keen competition for the Eastern markets between the Western nations which fundamentally prevents a united policy of pacification on the part of the Western nations. There is the equally sinister reaction of the yellow and black races to the armed example of the white race, which is divided within itself in its religious, economic, and political attitudes toward the other two races.

Let us keep clearly in mind that the recent developments in Japan and China in the use of aerial, chemical warfare

(a form of warfare particularly suited to the wide, undeveloped stretches in China, where aircraft can penetrate more quickly and more devastatingly than the older methods of slow-moving armies, cumbersome tanks, etc.) are directly traceable to the inventors of this form of warfare—the white race. Let us keep also in mind the fact that the French aviation forces, stationed overseas, increased from eighteen planes in 1919 to 385 planes, comprising forty squadrons, in 1931. This marked tendency has severe political consequences which need careful consideration. If colonial possessions are used as a pretext for increased aerial and land armaments, disarmament will receive another setback. The internationalization of long-distance aerial routes under a joint international control responsible to the League would remove some of the menacing dangers inherent in the present colonial system. Then, and then only, can the adjustment of the status quo in the colonial possessions, satisfactory to all concerned, be possible. If Germany could see this clearly, her opposition to internationalization might be considerably lessened. Then, and then only, can the irresistible development toward world organization be consummated, for the effective security of all. Then, and then only, will the now diminishing isolationist policies of such powerful non-members of the League as the United States and Soviet Russia be forced to a marked change, for the problem of their own security is now directing them into constantly closer coöperation with the League, and will direct them into League membership finally. To try every other way first and find each lacking is human nature. To come at last into the fold is inevitable.

Summary

With the manifold interests of mankind clamoring for some effective form and integration, it is impossible for any one organization such as the present League, under-

staffed and on a budget which would provide one-fifth the cost of one battleship, to meet all the requirements of a world where friction still abounds. There is much room for a real contribution of the organizations outside the League to international normalcy. Until the League has an adequate staff and an adequate budget, such contributions will and should increase. In whatever field of interest one turns today, touching the interests of the nations, a crying need is felt for international organization of such interests. One hears of the "world petroleum industry," or the "World Young Men's Christian Association," and literally thousands of international organizations are functioning today where there were only a very few twenty years ago. (See compilation by Shotwell.) Outside the League or inside the League, this international force continues to grow. To list the next steps in the development of the League and in the consummation of security is unwise and unnecessary. The machinery for peace is well indicated in every field. This machinery needs only the soothing oil of human comprehension and co-operation, and the unfaltering power which comes with iron will for peace driven by an electrifying purpose.

Scoffers and doubters there are in plenty, prophesying the death of this League and the end of all international co-operation. They have always been in noisy evidence when great changes are taking place. At the time that the American constitution was taking shape, even for long years after it had been in operation, the union of the states, according to the doubters and scoffers, would never hold. Even John Marshall, quoting from Mr. Raymond Fosdick's pamphlet—"Judicial World Organization"—"that heroic figure, who for nearly thirty years had led the fight for the Federal experiment, gave way to a moment of despair. He wrote to Mr. Justice Storey a letter in which he said: 'I yield slowly and reluctantly to the conviction that our Constitution can-

not last. Our opinions are incompatible with a united government even among ourselves. The union has been prolonged thus far by miracles. I fear they cannot endure." Substitute the League of Nations for the American union, which has endured more than one hundred and fifty years since this was written, and the sentiments of many doubters today would be expressed. The analogy between the formation of the American union of forty-eight states and the world organization with eventually sixty-two states is pertinent from many angles. For instance, each American state gave up the sovereign right to its own armaments and its own minting system when it entered the union. It was the union of states which guaranteeing the security of the member states, armed itself and imposed law and order among the member states. It was the union of states which gave to each state and the individuals in each state the opportunity for self-development, commensurate with the common good. Despite larger obstacles—such as language barriers, varying customs arising from varying historical backgrounds, difference in racial psychologies, a world organization is arising as impregnable in its united front against the downfall of civilization as the United States has proven to be in the Western Hemisphere. Again, during this economic readjustment through which the United States is passing, the individual states are impotent, separately, to solve their respective problems. It is the federal, or central, unified government which is providing for the economic well-being of the member states.

Conclusion

So the nations are brought face to face with the same unalterable fact. "In union there is strength."

CHAPTER II

THE LAST DEFENSE

"WHO in Europe does not know that one more war in the West and the civilization of the ages will fall with as great a shock as that of Rome?" Those of you who have read through these preceding pages find corroboration and summation in these words of the Right Honorable Stanley Baldwin.

Outlawry of All War in the Light of These Facts

Whether it be a war of defense or offense, a war for more territory or a war for national honor, the facts concerning war are before us. There is no excuse for war, there is no cause for war which does not involve the facts impartially presented in these pages. The arbitrament of arms for the settlement of disputes between nations invites disaster to the economic and moral structure of society without sufficient gains to begin to justify it. That is quite clear from post-war experiences. Those far-seeing strategists in each nation should now join forces with the opportunists in each nation for the complete abolition of war. The opportunists see their advantage appearing more favorably under the new order of international organization. Slowly—all too slowly—it is becoming evident that tolerance between nations, as tolerance between individuals is much more of a paying proposition than the former method of hating everybody and grabbing for oneself. When it finally dawns that there is more steady income, food, clothing, and shelter for

more people under a form of national economic well-being which permits support or work for everyone than the sporadic spurts of industry under war conditions, then the opportunists are ready to support the new order with heart and soul. The nations are in the midst of a drastic readjustment within their borders which is attempting to prove a similar point. Make tolerance, make coöperation pay—that is the goal. Given a reasonable period of increasing international coöperation to fight the common foe of economic malaise, with decreasing war scares and decreasing preparation for war, and this attempt is bound to win through. Advocates of more, bigger, and better wars have driven their thesis and their preparations to such extremes that the very terror of the inevitable consequences may be a blessing in rather thick disguise. The fear of using war as a national policy today may keep the nations quiet just long enough to permit other methods of settling disputes to become so ingrained and perfected that war itself will fall into disuse. If that is the aim of the militarists—to make war so terrible that they will knowingly lose their jobs by its abolition—then my admiration for their altruism is unbounded. We—all of us—must work for that final patriotic aim, from every angle of attack, and the contribution of each to that end is necessary to the existence of the nation and valuable for the development of the individual.

Looking out on the world today, this aim seems far from achievement. On the surface Europe is restless, arming, finding a precarious release from economic worries and financial troubles in a military stirring of the people, inspired and directed by the governments. The Near East—Syria, Palestine—seethe with unrest, while the Far East stirs with foreboding signs of coming storms. Africa has not found solutions for many of her political and economic problems, and Latin America faces north, east, and west for help and

support. There is not a corner of the globe which is undisturbed by these momentous changes.

But it was ever so. Action and reaction is the history of the human race, the story of our endless striving for perfection. "War in spite of its horrors, in spite of its bereavements, is only too quickly forgotten. A comparatively few years, and those who have passed through the fire are no more. New wealth is created; new antagonisms arise; and a new generation remembers only the romantic stories and the martial deeds of the fathers, or more fatally, organizes itself to avenge defeat. Then, once again, forgetful of the terrible lessons we have learned, the great nations unsheath the sword as the only solution to their problems. Our only hope lies in using the ensuing years to educate mankind to the principle that war brings misery and impoverishment to all engaged in it; that, in the final victory, it is not a question of which nation is left the strongest, but which is the least exhausted; and that national differences are as susceptible as personal differences to discussion and arbitration. Above all, let us guard against the old mistake of competitive armaments." So speaks the wise soldier, the fine militarist—Sir F. H. Sykes of Great Britain. Wars, at intervals of fifty years (more or less), then preparation for new wars, then war again: such is the cycle—almost the habit—into which the nations have fallen. The constructive attitude is proposed, despite the staggering load of armaments, the restlessness of minorities within the nations, the economic tragedy through which the nations are passing. That is—to hold together the nations in a universal world organization evolving in the teeth of these obstacles for the substitution of law for war.

The war cycles must then necessarily lengthen, the mental habit of regarding recourse to arms as the best settlement of disputes between nations must slowly give way to or be

supplanted by a new mental attitude of international co-operation. This change is terrific in its difficulties, discouraging in its infinitesimal progress, revolutionary in its ultimate effects. That is always the case when a bad habit, deeply ingrained, is being broken or, better, restrained and supplanted by a better habit.

War Cannot Be Abolished by Words

For war cannot be abolished by a treaty or even the "necromancy of words." It cannot be abolished by governments, no matter how desirous they may be to abolish it. It cannot be stopped by wishing—no matter who it is that wishes so hard. War can be controlled now and only finally abolished as the millions of people making up the nations want it controlled and finally stopped. Governments can go only as far as their people wish, and governmental delegates to international conferences are the slaves or puppets of their respective governments. If, then, this message of what war is today could get to the masses, if only the one clear impression of this message might be retained: that modern warfare cannot be restrained or contained,—mass murder for no one's benefit,—then, indeed, war will be controlled and finally abolished.

Dictators, kings, presidents, statesmen, know these facts about war today and are bending every effort to hold steady against the selfish interests which, profiting from war, are helping to keep the people stirred up. If only these selfish individuals, wherever they may be, would for one minute realize that poison gas and explosive bombs and shells might strike their own factories and their own precious families as well as those of others, then their coöperation in the control of the aërial menace might be more whole-hearted. How can it be made plain to these powerful, wealthy industrialists that war does not pay; abolition of war does pay?

It demands a far-reaching change not only in adult education, to make this axiom understandable to more and many more, but also a more fundamental change in the education of youth. There is only one thing that is thoroughly discouraging to me, so disheartening that courage temporarily falters—that is the teaching by direct misstatements, perverted truths, and half-truths, as well as lies, to the children in the schools of some countries about the children, life, and histories of other countries. When I see fine, intelligent teachers and professors dismissed because they dare to think that in other countries there are others as fine as the best their own country produces, I waver for a moment with faintness. A whole generation of children today is being consciously mistaught and misled in some countries. That sets back the clock of civilization and the progress of the idea of international coöperation many precious years. Queer, very queer, is the psychology behind these sinister moves.

The dictators who are mostly responsible for these moves are the very ones who most need international coöperation if they would succeed with their staggering home problems. In international conferences their delegates are usually tractable and only effervescent for the benefit of home newspapers. Why cannot these leaders follow Mussolini who, though dictator, has realized that the safety of his country demands a forward stand on disarmament, on close coöperation between nations? Politics must stay out of the schools and universities, a new orientation of the national curriculum to meet international conditions, a new realization that, to stir up, through moving pictures and newspapers, hatreds against other peoples is playing with more than fire. It is courting in the end destruction: that is the new message for education. Detailed and elaborated into the many spheres of educational activity, this new attitude so necessary for the stability and perpetuation of the nations

is called—moral disarmament. This is the form of disarmament which reaches the people intimately in their daily lives and tasks. Their endorsement and support can wipe off all the guns, cannon, bombing and military planes, tanks, battleships, submarines, etc., etc. The abolition of these old types of warfare can be permanent only if the education of the people in this new habit of mind is permanent.

The Development of New Attitudes by Peoples

Bend to this task with a will—all of you who seek new adventure, new fields of glory to conquer. Here is the challenge to youth, waiting for a challenge. Succeed here, even a little bit, each in your own corner of the earth, and the united effect is perceptible in a short time. Much has been done by educators, religious leaders, club leaders, and international organizations. Much more remains. The greatest reward will be the new vision and the dawning actuality. When titles and other material rewards will not be awarded so much for the invention of a new gun or a new gas; when money will stop rolling in for more munitions; when honors will not be paid to generals and admirals but to scientists and writers—then the beginning of the tide toward a deeper, truer education of the people will have started. History is full of the planned hatred within and between nations, and the resulting wars. The time has come for planned friendliness.

The League of Nations, as the exponent of planned friendliness has gone as far as it can at the present time along this route. Now the peoples must stand behind their governments to give them the assurance needed so that international conferences may go farther toward real success. The conference table method has not broken down although as I write, the first World Economic Conference has come to a close without, at the time, great tangible results. This

conference table method needs a deeper technique—more precise from two angles: first, longer, more careful preparation for each conference and more detailed development of the agenda for each international gathering for commensurate results (this is easily achieved if the budget of the League of Nations Secretariat were enlarged so that under its auspices, the experts could be paid some adequate salary—the cost of one battleship per year—forty million dollars would do this handsomely—which do you choose?); secondly, a development of national psychology on the part of the delegates at international conferences, supported by their peoples back home, which will not demand at the conference table more than can be obtained and will be willing to compromise more quickly in order to achieve constructive results. This, then, indicates some of the necessities in the alternative to war. This is the newer patriotism; this is enlightened nationalism. These changes in the conference table method indicate a development of the honor and ethics of the conference table, as punctilious and more successful than the honor and ethics of the days of chivalry.

The pace of these changes depends on the people back home, who will adjust national politics sufficiently for international accomplishments, to the benefit of both. This pace must be accelerated in each and all of the nations. Nationalistic isolation is eventual and inevitable self-destruction in a world of airplanes and poison gas.

The Effect of Aviation and Chemical Warfare on an Evolving World State

This study of the possible means of abolishing chemical warfare or of the attempt to control it recalls an arresting historical analogy which may be used for guidance in this new field of evolving world organization.

When gunpowder was first used (it was first mentioned

by Roger Bacon in 1270), the same hue and cry was raised which has been heard against chemical warfare. Gunpowder was outlawed; it was forbidden to be manufactured; it was held an invention of the devil. (This is the stage of gas warfare today.) However, despite these attempts at abolition or even control, gunpowder was used because it was found to meet the requirements of warfare as it was then developing. This usage did not make warfare any more humane, but it did have a startling effect on the development of society.

With the continued use of gunpowder, the feudal knight in his lonely castle, and the individual walled city-state which arose after him, were battered down by the new means of warfare—guns and cannon-balls discharged by gunpowder. The king was supreme because only the larger political unit, with its massed military strength, could be protected or could resist this gunpowder form of war. Thus the use of gunpowder fostered the larger political unit, the nation. With poison gas warfare now not merely possible, but very probable, the independent political unit of the nation is, in turn, so endangered that it must disappear likewise into a larger grouping—a regional and intercontinental group of nations, banded together against this uncontrollable military menace.

Gunpowder had an equally astonishing effect on the cultural and economic life of the times. The value to a king of an individual knight with his few cohorts became insignificant in warfare, for gunpowder soon annihilated such small groups. To the king, then, the value of the man disappeared, and the value of the mass appeared if he would be the victor. So the masses had to be cultivated for the king's army. Thus gunpowder deeply affected the cultural life of the time. So, too, is the evident uncontrollability of chemical warfare, if once indulged in, slowly affecting the

cultural life of our modern community. The common danger to all peoples, when fully recognized, will arouse a feeling of brotherhood between nations which no amount of teaching has been able as yet to develop.

From the economic influence of gunpowder on its times an equally astonishing parallel can be drawn. With the establishment of the kingdom to meet this war menace, to find security together within the national state against a common foe, there developed the unified country, with unified taxes and a unified army under unified control. The effect of chemical warfare on the national states will be different only insofar that, after the nations shall have put their respective economic systems in order (this being the painful process we are witnessing today), we shall find that these national systems will not stay in order unless there is close and constructive international economic contact. Inevitably, then, a continental and intercontinental economic unity is being and will be further developed under a central authority with, at the same time, centralized military control. Such is the stuff from which modern security is being evolved. To the discerning eye this slow metamorphosis in the political, cultural, and economic structure of our times can be detected now, with the threat of the use of aërial chemical warfare as one of the main spurs.

Modern wars have demanded longer gun range, greater rapidity of fire, an intensification of the gunpowder era, possibly reaching its zenith—to give way to the use, by surprise methods (when the prosecution of the World War, at an acute stage, demanded a newer, more widespread, more effective weapon) of poison gas.

The value of surprise, whether in tactics or in weapons, has always been the greatest asset of warfare. The French 75mm. gun was the pride of the well-established militarism and represented the security of France. The Germans showed

that such permanent siege guns could be made into movable field guns for surprise action,—and Paris was shelled. But even that did not bring victory. Pressed by the demands of the war, the German chemists turned to another weapon, whose use at the time was a complete surprise—poison gas. There at Leverkusen, Professor Haber, at the command of the military leaders, worked out the types, technique, and manufacturer of poison gas from coal tar products while his fellow-chemists in the same laboratory, and from the same basic products, were working out a cure for sleeping sickness. So closely, in chemical research, are war-time and peace-time usages intertwined. The Allies followed suit, in the attempt to break the deadlock on the Western Front, and the race is now on in all chemical-producing and industrial nations.

The significance of the deadlock produced by the massed armies during the World War has not yet reached, in its full importance, the minds of the people. This deadlock ended for all time (we hope) the theory taught in military manuals that massed, armed forces can by sheer mass and force of arms overcome other massed, armed forces. The number of feet and inches of French ground gained and lost during the World War by both sides had no value in proportion to the losses in men and material involved. That fact has sunk into most military minds. Now, the only hope for victory (this was only barely sensed during the World War) lies in swift surprise attacks by aviation and explosives and poison gas.

During the World War this lesson was not learned soon enough, despite the fact that land forces were unable to achieve their objectives without tremendous loss of life and prohibitive costs. In the next war, the futility of these tactics will be recognized much earlier (so the advanced

military critics assure us) and the new offensive weapons will be used independently of the infantry to strike directly at industrial centers, mobilization points, and large cities. This new warfare involves and threatens with destruction men, women, and children, because we, the non-combatants, are directly in the way of this new type of militarism. It needs, for its successful existence, the most ruthless and most widespread destruction behind the lines; in plain words to break the will of the enemy to resist. Thus aviation and chemical warfare are inherent in and imperative for modern wars.

This development of poison gas for war uses was a product of the intensity of the World War. The means of protection were developed as fast as they could be developed under such stress. Always, however, the means of protection had to lag behind the use of new gases. Each new gas was held and is still held as of the greatest military value because of its surprise element. Its whole value (as is true of other factors throughout the evolution of warfare) lies in catching the enemy unprepared. Thus science has come to the aid of the hard-pressed military men. The process of continuing development of chemical and physical sciences is one that by its very nature cannot stop during peace, any more than it can stop during war. Where imperfection or waste is found in industry or in life, there the scientist is stimulated to intensify and continue his research until he is successful. This control over nature which the scientist has started to exercise is only at its very beginning. Mass destruction through chemical warfare and by means of high explosives is only the forerunner of an era still unknown, when the atom will explode under human control and all the latent forces of this dynamic world will be available for the furtherance of the destruction of civilization.

The Last Defense

Against these latent forces, if used for purposes of destruction and surprise in war, there is no protection, either for the soldier or the non-combatant. We have seen in the foregoing pages what the situation actually is today. There is only one answer to this menace—a world organization to supervise disarmament and to settle international disputes by peaceful means.

Because the League has continued, even crippled by lack of universal membership and hampered by insufficient funds, so excellently, is due to its inherent necessity and its inherent strength, derived from the faith which the peoples and their governments have in international organization in this modern world. In every sphere of its activity (which now touches every form of human interest) it brings together the best experience and the best minds of the member nations. That work alone is indispensable. That the member nations carry on so gallantly, despite the absence of the one nation which sponsored its birth so wholeheartedly, is great credit to the sportsmanlike attitude of all nations and races members of the League. The League of Nations represents the only international organization capable of tackling and, in time, of solving the question of how much security for how much disarmament in the twentieth century.

This new education, these resulting changes in the habits of the people and in the international conference, these challenging ideas of a new world evolving out of disorder, through the work of the League of Nations, this insistent idea, now proven by fact, that our safety against aerial chemical warfare depends on international coöperation—all this leads to a fine, compelling, new interpretation of patriotism. The coöperation of each nation with every other nation for the safety of each and all—that is the new patriotism. That is the last defense.

CHAPTER III

SUMMARY AND CONCLUSIONS

FROM the point of view of the non-combatant, herded and crowded into the great industrial centers of the world, there is no adequate protection from concentrated attacks of lethal gases and smokes.

There are insufficient gas masks and even if issued in quantity, deteriorate so quickly that there is no protection in gas masks.

It is unwise and in most cases impossible to house these millions in underground passages whose elaborate specifications preclude the numbers seeking shelter.

International agreements outlawing the use of lethal gases are excellent but there is no protection in them to the millions of non-combatants. Experience and history show that such agreements have been broken in the past and must be broken again in the future when the need arises. Such agreements have invariably been hedged around with reservations and have never been ratified by all states. Hence, in the emergency, their legality has been in question, the very loop-hole needed for its use.

The progress of civilization and of industry demands continued research in chemistry, one of the primal industries, but with this progress and research, uncontrollable and widespread, comes added menace to the non-combatant from new surprise lethal gases. The close interrelationship between the private chemical industries and the government defense chemical service, is continuous and indissoluble. This research in new death-dealing agencies is not confined alone to the chemical industry. Electricity is just beginning to

make its contribution and the progress of science in other fields assures us that each new scientific discovery, if adaptable to destruction, will and must be so used in the war of the future between highly industrialized nations. There is no protection against these new discoveries for the millions of non-combatants.

Some form of chemical disarmament is possible but it should not mislead the millions of non-combatants; for the quick conversion of peace time industry into war producing lethal gases and explosives is being reduced in time lag with each passing year.

From the point of view of the non-combatants, herded and crowded into great industrial centers, there is no protection against aerial bombing attacks. Bomb shelters will never house the clamoring millions effectively and the complete destruction above ground greeting the eyes of the survivors, would not make life worth living or create energy for rebuilding. The combination of the wide and fast cruising airplane and lethal gas opens to attack every city in Europe and eventually every city in the world.

The constant improvements in airplane construction and engine performance mean wider cruising radius from the base and hence, wider possibilities for attack. The unceasing development and emphasis on improvement in military and naval aviation, not only increases fear between nations but also, widens the field of efficient attack on non-combatants.

The constant improvements in commercial and civil aviation, built up on nationalistic lines—even the air above the national confines is “national air” to be used only by permission, indicates conclusively that such civil and commercial aviation is considered a main line of defense in case of war. The conversion time from civil use to war use is being yearly shortened by new inventions.

International rules regarding bombardment zones are so vague and are open to differing interpretations; are not yet

agreed to by a sufficient number of nations; are so conflicting that there is no protection for the non-combatant in the crowded cities from these international agreements.

The ceaseless development in bombing planes and military and naval aviation indicates clearly that no air rules will or can restrain the aerial attackers.

Even if bombing planes are wiped out, even if military and naval aviation is materially restricted, the conversion of commercial planes owned on a national basis into defense units as war planes has been proven practical and efficient.

Hence, the unceasing and uncontrollable development of commercial aviation can be regarded in peace times as one of the great boons to humanity and in threatened war times, in combination with the easily convertible peace time chemical factories, a deadly menace to the helpless non-combatant millions in the crowded cities.

Conclusions

Having proved conclusively that from the indicated air war of the present and future there is not nor ever can be adequate protection for the millions of non-combatants in the crowded centers of the world, the conclusion is evident—that militarism, having expanded like an overgrown mastodon into every aspect of human life and then found wanting in its main and only function—to protect its nationals—should, like the mastodon disappear.

Its disappearance, like the disappearance of the useless mastodon, should be gradual but inevitable and drastic.

The First World Disarmament Conference on the basis of the facts presented in regard to the ceaseless development of research in death-dealing agencies and the uncontrollable development of aviation, can and should heed this solution for its labors if it would not be behind the times—the abolition of all aggressive types of armament and the retention of only so much as confers a national police force.

Such is the effect on disarmament of the aërial menace. But that is not the only effect of the air menace.

To cope with it adequately is to meet two other important challenges.

The final and effective solution for the problem of adequate security involves in view of these facts presented impartially, some effective form of internationalization of commercial aviation, some adequate international agreement on air rules, some adequate control and supervision of all armaments, some adequate control over the shipment of arms and ammunition from one country to another, some constructive solution for the settlement of all disputes between nations either in the economic, financial or political spheres. No other one agency can accomplish all these necessary prerequisites for national security but a universal world state. For the safety of each nation today in view of the unceasing improvements in aviation and chemical warfare, there is no other answer.

Neither the much needed world state nor national security as such can be successful unless there is developed, furthered and encouraged in every way, that feeling of trustfulness between peoples, that understanding that unless we all hang together, we all hang separately, as Benjamin Franklin said of the American union at its beginning. This feeling of mutual rapprochement, so necessary to the salvation of the national state under modern conditions of warfare, is summed up in the phrase—"moral disarmament."

Together, international control over commercial aviation, the abolition of aggressive types of weapons, international aërial police force, a universal world state, spiritual rebirth which is indicated in the phrase—moral disarmament—together all these deeply needed factors can cope with the air menace. They are the attainable answer to this menace.

APPENDIX



APPENDIX I

DEFINITION OF CHEMICAL WARFARE

"THE Committee endeavoured to specify what should be included in the general definition of chemical weapons and methods of warfare:

(a) As regards substances, it included all harmful substances, whether natural or synthetic, whatever their state, whether solid, liquid, or gaseous; poisons such as curare or snake-poison are thus included in the definition.

(b) The Committee was unwilling to undertake an enumeration of the various categories of substances according to their chemical composition. It was essential to draw up a definition which should apply to all substances, both those at present known and those which might be discovered subsequently. The Committee therefore adopted as its criterion the physiological effects of the substances on living creatures. All substances having a harmful effect were included in the definition."

The report goes on to state:

"No account was taken of the degree of harmfulness of these substances. It was thought that if certain gases less pronouncedly harmful in their effects were excluded from the field of qualitative disarmament, the practical value of the system would be considerably weakened."

A few paragraphs farther along it is stated that, in the Committee's opinion, the prohibition should extend also to substances harmful to animals. It was not thought necessary to include reference to substances harmful to vegetables, because it was felt that in practice substances which would damage vegetables would also harm human beings or animals, or at least make the vegetables harmful to them.

Later the report continues:

"It is clear that qualitative disarmament only applies to the use of chemical substances if such use is designed to injure an enemy.

They are not necessarily used during a military action properly so called; for example, the poisoning of wells or springs from which an enemy might possibly draw water would be prohibited. On the other hand, the use of chemical substances for the maintenance of armies—for example, the use of disinfectants and medicaments and the means of destroying harmful animals and parasites—is not in question.”

“The Committee considered it necessary to state very clearly what ought to be excluded from its definition.

(a) It had in mind, in the first place, explosives: the combustion of explosives may cause a discharge of noxious substances (such as carbon monoxide) which may, according to the circumstances, have more or less serious destructive effects. That is a consequence that cannot be prevented by any means short of prohibiting explosives. At the same time, any practice designed to increase the discharge of noxious substances must be condemned. Such a practice might consist either in introducing certain products into the explosives or in altering the constitution of the explosives, or in adopting a special method of manufacturing the projectiles.

(b) In the second place, the Committee had in mind smoke and clouds. Smoke can be used for various purposes: as a screen, or for signalling, etc. It is to be clearly understood that the smoke and clouds which are used must not be capable, in normal conditions of use, of producing harmful effects upon the organism.

“The Committee desired to include among the objects of qualitative disarmament a class of weapons to which the Soviet and Italian delegations had drawn the attention of the Conference—namely, ‘all appliances, devices or projectiles specially constructed for the utilisation of the said noxious bodies, with a view to injuring an adversary’; it thus condemned material which can only be used for chemical warfare.”

It is then obvious that even the term “poison gas” cannot be defined with such clarity that its use would be absolutely prohibited. This is important, for the loophole which is permitted by elusive, elastic definitions covers a multitude of sins when the time for action comes. This fault has been evident many times in international conventions in connection with attempts to define and abolish types of arms, as we shall see later. (Hague Convention of 1907.)

Therefore—poison gas has come to stay.

APPENDIX II

INTERNATIONAL AGREEMENTS ON CHEMICAL WARFARE

(the majority of which are not binding)

AGREEMENT reached at the first Hague Conference, in 1899, and signed by all except Great Britain and the United States:

The undersigned, plenipotentiaries of the powers represented at the International Peace Conference at the Hague duly authorized to that effect by their governments—

Inspired by the sentiments which found expression in the declaration of St. Petersburg of November 29 (December 11), 1868,

Declare that:

The contracting powers agree to abstain from the use of projectiles, the sole object of which is the diffusion of asphyxiating or deleterious gases.

The present declaration is only binding on the contracting powers in the case of war between two or more of them.

It shall cease to be binding from the time when, in a war between the contracting powers, one of the belligerents shall be joined by a non-contracting power.

The present declaration shall be ratified as soon as possible.

The ratifications shall be deposited at The Hague. A procès-verbal shall be drawn up upon the receipt of each ratification, a copy of which, duly certified, shall be sent through the diplomatic channel to all contracting powers.

The non-signatory powers may adhere to the present declaration. For the purpose, they must make their adhesion known to the contracting powers by means of a written notification addressed to the Netherland Government and by it communicated to all the other contracting powers.

In the event of one of the high contracting powers denouncing the present declaration, such denunciation shall not take effect

until a year after the notification, made in writing to the Government of the Netherlands, and by it forthwith communicated to all the other contracting powers.

This denunciation shall have effect only in regard to the notifying power.

In faith of which the plenipotentiaries have signed the present declaration and have affixed there seals thereto.

Done at the Hague July 29, 1899, in a single original which shall remain deposited in the archives of the Netherland Government and copies of which, duly certified, shall be sent through the diplomatic channel to the contracting powers.

The 1907 Hague declaration reads as follows:

The undersigned, plenipotentiaries of the powers invited to the Second International Peace Conference at The Hague, duly authorized to that effect by their governments.

Inspired by the sentiments which found expression in the declaration of St. Petersburg of the 29th November (11 December), 1868, and being desirous of renewing the declaration of The Hague of the 29th July, 1899, which has now expired,

Declare:

The contracting powers agree to prohibit, for a period extending to the close of the Third Peace Conference, the discharge of projectiles and explosives from balloons or by other new methods of a similar nature.

The present declaration is only binding from the time when, in a war between the contracting powers, one of the belligerents is joined by a non-contracting power.

The present declaration shall be ratified as soon as possible.

The ratification shall be deposited at The Hague.

A procès-verbal shall be drawn up recording the receipt of the ratifications, of which a duly certified copy shall be sent, through the diplomatic channel, to all the contracting powers.

Non-signatory powers may adhere to the present declaration. To do so, they must make known their adhesion to the contracting powers by means of a written notification, addressed to the Netherland Government, and communicated to it by all the contracting powers.

In the event of one of the high contracting parties denouncing the present declaration, such denunciation shall not take effect

until a year after the notification made in writing to the Netherlands Government, and forthwith communicated by it to all the other contracting powers.

This denunciation shall only have effect in regard to the notifying power.

In faith whereof the plenipotentiaries have appended their signatures to the present declaration.

Done at The Hague, the 18th October, 1907, in a single copy, which shall remain deposited in the archives of the Netherlands Government, and duly certified copies of which shall be sent, through the diplomatic channel, to the contracting powers.

Thereto should be included Article 23 of the 1907 rules adopted for war on land which states:

In addition to the prohibitions provided by special conventions, it is especially forbidden:

- (a) To employ poison or poisoned weapons;
- (b) To kill or wound treacherously individuals belonging to the hostile nation or army;
- (c) To kill or wound an enemy who, having laid down his arms, or having no longer means of defense, has surrendered at discretion;
- (d) To declare that no quarter will be given;
- (e) To employ arms, projectiles, or material calculated to cause unnecessary suffering;
- (f) To make improper use of a flag of truce, of the national flag, or of the military insignia and uniform of the enemy, as well as the distinctive badges of the Geneva Convention;
- (g) To destroy or seize the enemy's property, unless such destruction or seizure be imperatively demanded by the necessities of war.

(b) To declare abolished, suspended, or inadmissible in a court of law the rights and actions of the nationals of the hostile party.

One way of attempting to limit chemical warfare is through the attempt to limit aerial bombardment. A Commission of Jurists, with military and naval advisers, representing France, Great Britain, Italy, Japan, Holland, and the United States, met at The Hague from December 11, 1922, to February 19, 1923, and laid down the following, in Rules of Air Warfare:

Article 22: Aerial bombardment for the purpose of terrorizing the civilian population, or destroying or damaging private prop-

erty not of military character, or of injuring non-combatants is prohibited.

Article 23: Aërial bombardment for the purpose of enforcing compliance with requisitions in kind or payment of contributions in money is prohibited.

Article 24: (1) Aërial bombardment is legitimate only when directed at a military objective, that is to say, an object of which the destruction or injury would constitute a distinct military advantage to the belligerent.

(2) Such bombardment is legitimate only when directed exclusively at the following objectives: military forces; military works, military establishments or depots; factories constituting important and well known centers engaged in the manufacture of arms, ammunition, or distinctively military supplies; lines of communication or transportation used for military purposes.

(3) The bombardment of cities, towns, villages, dwellings or buildings not in the immediate neighborhood of the operations of land forces is prohibited. In cases where the objectives specified in paragraph 2 are so situated that they cannot be bombarded without the indiscriminate bombardment of the civilian population, the aircraft must abstain from bombardment.

(4) In the immediate neighborhood of the operations of land forces the bombardment of cities, towns, villages, dwellings or buildings is legitimate provided that there exists a reasonable presumption that the military concentration is sufficiently important to justify such bombardment, having regard to the danger thus caused to the civilian population.

(5) A belligerent State is liable to pay compensation for injuries to person or to property caused by the violation by any of its officers or forces of the provisions of this article.

At the League of Nations Traffic in Arms Conference in 1925, American delegates presented a strong plea for the abolition of poison gas. While a protocol was adopted and signed by a large majority, very few nations ratified it, for lack of active support of public opinion. This reads as follows:

Protocol on Abolition of Lethal and Other Gases (1925)

The undersigned plenipotentiaries, in the names of their respective governments:

Whereas the use in war of asphyxiating, poisonous or other gases

and of all analogous liquids, materials or devices has been justly condemned by the general opinion of the civilized world and—

Whereas the prohibition of such use has been declared in treaties to which the majority of powers of the world are parties and—

To the end that this prohibition shall be universally accepted as a fact of international law, binding alike the conscience and the practice of nations:

Declare:

That the High Contracting Parties, so far as they are not already parties to treaties prohibiting such use, accept this prohibition, agree to extend this prohibition to the use of bacteriological methods of warfare and agree to be bound as between themselves according to the terms of this declaration.

The High Contracting Parties will exert every effort to induce other states to accede to the present protocol. Such accession will be notified to the Government of the French Republic and by the latter to all signatory and acceding powers and will take effect on the date of the notification by the Government of the French Republic, which will at once notify the deposit of such ratification to each of the signatory and acceding powers.

The instrument of ratification of and access to the present protocol will remain deposited in the archives of the Government of the French Republic.

The present protocol will come into force for each signatory Power as from the date of deposit of its ratification, and from that moment each Power will be bound as regards other Powers which have already deposited their ratification.

At the Conference of Central American Republics held at Washington in 1923, a convention for the limitation of armaments was signed on February 7, 1923, by the Republics of Guatemala, Salvador, Honduras, Nicaragua, and Costa Rica. Article V of this convention reads:

The Contracting Parties consider that the use in warfare of asphyxiating gases, poisonous or similar substances, as well as analogous liquids, materials or devices is contrary to humanitarian principles and to international law, and obligate themselves by the present convention not to use said substances in time of war.

This is the only international agreement on the abolition of poison gas which has been ratified by all signatories and, hence, is binding on all signatories.

Various interesting developments have occurred which have not resulted in international agreements. For example, the League of Nations Council on May 9, 1920, authorized a commission to study the question of chemical warfare. This and similar commissions have reported to the League Assembly in its annual session, called each September. The response of the Assembly has been couched in these or similar terms:

The Assembly, having examined the report of the Temporary Mixed Commission with regard to the probable effects on warfare of chemical discoveries;

Being convinced that the means which modern science places at the service of warfare renders the latter a great danger to civilization;

Recalling the seventh resolution of the Third Assembly regarding the adhesion of all States to the Treaty concluded at Washington on February 6, 1922, concerning the use of asphyxiating gases in time of war:

Requests the Council, if it considers it desirable, to publish the report of the Temporary Mixed Commission and, if advisable, to encourage the work of making information on this subject generally accessible to the public;

Noting, on the other hand, the facility and rapidity with which factories for producing chemical substances required in peace time can be transformed into factories for chemical warfare:

Recommends that the attention of public opinion throughout the world be drawn to the necessity of endeavoring, in the first place, to remove the causes of war by the pacific settlement of disputes and by the solution of the problem of security, in order that nations may be no longer tempted to utilize their economic, industrial, or scientific power as weapons of war.

A special committee appointed by the Temporary Mixed Commission for the Reduction of Armaments from its own personnel in 1924 made a report, based on answers to questionnaires to leading chemical and war experts in the world, and signed by four outstanding authorities. The scope of the questionnaires was defined thus:

The aim is to show to the public opinion of the world the effects which would be produced by the most powerful means of destruction placed at the service of modern warfare and by modern science.

It will be borne in mind that henceforward an armed nation, utilizing the whole of its human and material resources, will attempt to strike, not only at the combatants on the enemy's front, but at the whole enemy nation in arms—its population, its riches, and its resources of every kind.

War of this sort, which carries destruction beyond the fighting lines and which renders opposing nations vulnerable to the extreme limits of their territories, has been made possible by the increasing range of modern guns, by the far-reaching activity of air forces, and by conveying and disseminating in other ways the means of destruction.

Without discussing the legitimacy of such practices, we may endeavor to discover what is possible in warfare, whether permitted or not by the laws of war, in order that the public may have an accurate conception of the dangers which it has to fear.

In these circumstances, it is desirable to obtain from the most qualified experts as detailed and complete a statement as possible of the effect which would be produced—

on animal life,

on vegetable life,

on the wealth and resources of all kinds of a country which is attacked at any point of its territory;

(1) By chemical warfare by means of the most powerful explosives, chemical products and gases, as already practised and as further developed since the last war;

(2) By bacteriological warfare by means of microbes or any other agent if, in defiance of all human laws, its effectiveness should induce nations to adopt it.

The questionnaire was answered by outstanding chemistry professors in France, Italy, Germany, Belgium, Denmark, and two from the United States, Professor W. B. Cannon, of the Harvard School of Medicine, and Professor J. E. Zanetti, of Columbia University. This is their report.

I. CHEMICAL WARFARE

It is well known that, after the first violation of the Hague Convention, chemical warfare was employed with effect by the belligerents during the last war as extensively as any other arm. It is to be feared that it will be still more so in the future. It should be noted that this form of warfare proved to be effective

in circumstances in which other arms would have produced little or no effect.

Professor Angeli (of Florence) writes:

"Though the experience of the recent war has shown that no fortifications or armour can resist the force of modern explosives, the men themselves could at least find safe shelter from them in trenches, caves or dugouts sunk deep underground. But poisonous gases can go everywhere, both in the open and into the dugouts."

The various methods employed, the wave or cloud of heavy gas borne by the wind towards the enemy, the firing of poison shells intended to produce clouds of very thick gas in the enemy lines, or to poison the ground, were directed against, and reached combatants in the front lines. But it is possible to conceive of other methods in the future, such as the dropping from aircraft of bombs or other containers filled with noxious products, which would strike at civilian populations as surely as at combatants. "It is doubtful," writes Professor Andre Mayer, "whether the peoples of the world are aware of the power of this weapon and the danger which threatens them." Professor W. B. Cannon goes still farther when he states that "we have seen in the great war nothing approaching the probabilities of destruction of manufacturing centres and civilian populations that would be likely in case another great conflict should occur."

The term "gas" as used in connection with warfare does not correspond to the scientific definition of gases. In reality it includes not only gases but also solids or liquid substances which are reduced to powder or spray in the air. These substances produce lesions in the human body, due to chemical changes quite distinct from the mechanical effects produced by explosives.

Such substances are not by any means rare. The majority are common materials ordinarily manufactured and employed in large quantities for peace-time requirements, so that "there is very little difference between the manufacture of pharmaceutical products and that of injurious substances used in war."

First of all, it will be noted that, as was emphasised by the Government experts at the Washington Conference, "many high explosives produce toxic gases that frequently cause death, as do those termed chemical-warfare gases."

Apart from this, arms intended to kill or disable an adversary have hitherto attained their object by more or less mechanical

means. Their projectiles lacerated the human body and reached vital organs; and the wounds themselves caused asphyxiation to a greater or lesser degree as a result of hemorrhage. Chemical warfare utilizes a greater variety of methods for temporarily or permanently putting a man out of action. The chemicals act on the constituent elements of the tissues and cause changes which finally disturb the normal functions of the body and result in death. We may demonstrate the variety of its effects by taking two extreme cases: for instance, the action of carbon oxychloride, which produces suffocation, pulmonary complications, and death, and that of benzyl bromide, the vapours of which, spreading over the ground, cause tears to run and prevent the adversary from opening his eyes, without, however, producing any serious after-effects.

In the first case, the elimination of the adversary is carried to the point of death. In the second case, a temporary suspension is obtained by a mild physiological effect. Between these two extremes there is a wide range of intermediate effects. We can, however, from the point of view of their physiological action alone, divide these noxious substances into three main categories:

Irritant (lachrymatory, sneeze-producing and blistering) agents;
Suffocating or asphyxiating agents;
Toxic agents.

Effects of Irritant Agents (These bodies possess the property of putting a man out of action without killing him):

(1) *Lachrymatory Agents* deprive a man of one of his essential senses—sight. They produce intolerable pain in the neighborhood of the external organs of sight and render a man practically blind as long as he remains in the gas-impregnated atmosphere. But, "contrary to popular opinion," says Professor Zanetti, "the blinding effects of these gases is purely temporary, being caused only by the irritation of the membrane of the eyelids and not by any deep-seated effect on the eyeball or optic nerve. The effect usually passes in a few hours, or a few days at the most, and although the victim is as completely put out of action as if his eyes were gouged out, there is no record of permanently serious effect being produced thereby."

The efficacy of lachrymatory gas, coupled with its property of not causing permanent disablement, has led to its adoption by police

organizations. By its means criminals may be captured without loss of life.

(2) *Sneeze-producing Agents* are arsenical compounds very similar to the cacodylates used in therapeutics; they cause constant and uncontrollable sneezing, attacks of suffocation and intolerable headaches. They drive the men to get rid of their protecting masks, thus exposing them to the action of other toxic products which may be fired concurrently or immediately after the sneeze-producing gas.

(3) *Blistering Agents*. Certain products such as dichlorethyl-sulfide, also called "mustard gas" or "yperite," cause lesions to the skin and mucous membranes which may be of a very serious character. Whenever the skin is exposed even to the vapour exhaled from the slow evaporation of the yperite, blisters appear within a period of two to eight hours; they may merely be small blisters produced by slight exposure or, on the contrary, an extremely serious general blistering of the whole body produced by prolonged exposure to the vapours or actual contact with the liquid. The action of this gas produces necrosis of the mucous membranes and leaves a raw surface extremely susceptible to infection. In short, although the action of blistering gases may be combated, and even in certain cases nullified, this action is nevertheless capable of producing most serious effects on the health of the men who have been subject to it.

Moreover—and this is the principal effect—soil which is saturated with yperite contaminates by contact persons who pass over it or are posted on it. The yperite penetrates the fabric of clothing and turns it into an actual blistering plaster, the blistering properties of which may be communicated by mere contact. The ground and any articles which have been impregnated with the gas remain dangerous for a number of days.

Effects of Suffocating or Asphyxiating Agents

So-called suffocating or asphyxiating bodies cause fatal damage to the lungs. Thus chlorine, bromoacetone, chloropicrin, carbonic oxychloride, and acrolein, when inhaled, cause hemorrhage in the air cavities of the lungs. Pulmonary edema causes death in the same manner as drowning, death being attended by very painful spasms. Of all the gases in this category, carbon oxychloride, also known as phosgene, has been the one most effectively employed.

Other agents directly affect the blood, *e.g.*, carbon monoxide, which usually causes death by syncope, and contrary to general belief, without pain. This absence of pain, coupled with the unconsciousness of the existence of any lesion, aggravates the dangers, as it is difficult to make the victims realize their serious condition and keep them from making any exertion which would add to the burden of an already overworked heart.

Effects of Toxic Agents

Finally, the toxic agents of the nervous system, such as derivatives of prussic acid, kill by instantaneously suppressing the functions of the nervous system. The gases of this kind, however, which are at present known, only produce this paralyzing effect when somewhat highly concentrated.

Multiple of Combined Effects

It should not be supposed, however, as Professor Mayer very rightly observes, that each of the substances which have been used in warfare possesses only one property as enumerated above.

"Many of them combine several. All the lachrymatory and suffocating gases are fatal if taken in large quantities. If the blistering substances, instead of affecting the skin, penetrate into the lungs, they produce fatal lesions. Thus the effect to which we refer when we speak of a lachrymatory or blistering substance is only the predominant effect. The alteration in the strength used—an alteration which may be obtained by changing the charge of the projectile or the concentration of fire—completely transforms the injurious effects. Thus a weak concentration of dichlorethylsulphide produces a simple inflammation of the eyes and acts like a blister applied to the skin; strong concentration causes lesions of the eyes which produce blindness, and lesions of the lungs which lead to a progressive obstruction of the air channels and to death by slow suffocation. It would, therefore, be a mistake to classify chemical compounds according to the gravity of the symptoms to which they give rise.

"Combined effects consisting of various destructive actions may be obtained either by releasing several substances together or from one substance having several properties. In this connection, attention should be drawn to certain combined effects which have

long been known and which are produced by explosives and gases. Most modern explosives at the moment of explosion give off gases, many of which are highly toxic, *e.g.*, carbon monoxide, which destroys the action of the blood and is a typical asphyxiant. Many cases of asphyxiation resulting from explosions in confined spaces were observed in mine warfare."

After-Effects of War Gas

Although this view is not accepted unanimously, it would appear that lesions caused by noxious agents leave traces which permanently affect the victims. In particular, injury to the lungs may predispose to certain infectious diseases.

Possible Effects of New Discoveries

The gases mentioned above, the effects of which have been briefly described, are gases which are well known and—it cannot be too often repeated—are in common use in industry in peace time. But no guaranty can be given that new substances will not be discovered which affect other functions of the body. "It is conceivable," observes Professor Zanetti, "that gases may be invented that would impair the digestive functions, or, as was actually tried, which would cause severe vomiting or interfere, as carbon monoxide does, with the normal functions of the hemoglobin of the blood in carrying oxygen from the lungs to the tissue." That, it is true, is only a hypothesis. Senator Paterno considers that this hypothesis "ought not to be excluded," but, nevertheless, points out that nothing warrants us to believe that new substances of greater military value than any yet known can be discovered and manufactured on a large scale. "To say that, at the beginning of the war, about thirty asphyxiating gases were known, whereas today there are more than 1,000, is for him an entirely valueless argument, seeing that this rapid increase from thirty to 1,000 does not include any recently discovered substances, and that phosgene, chloride of cyanogen, and yperite, which occupied the foremost places among the thirty, still occupy the same places among the 1,000. The obvious conclusion to be drawn from this fact is that fresh researches carried out on the 1,000 substances have proved fruitless," and Professor Paterno, although he "believes that chemical preparation for warfare in general is indispensable," concludes, as regards the question of asphyxiating gases, "that we

must neither hope nor fear that the progress of chemistry will lead to any greater success in the discovery of these gases than in discovering explosives."

Effects of Gas on Animals

The effects on animals are essentially the same as those on human beings and the differences which have been observed in the sensitiveness of the former are relatively slight.

Effects of Gas on Vegetation

It would not appear that vegetation is affected by gas. In the experimental fields or in their immediate neighborhood, the vegetation does not show serious effects from repeated exposure to toxic gases. In the dense forest of the Argonne, which was saturated with gas in the latter stages of the war, the vegetation in the following spring showed no effects whatever.

Effects on Other Sources of Wealth

The following observations are taken from Professor Zanetti's report, as he is alone in having considered the effects of gas on a country's sources of wealth.

"The effects would be indirect and would be due either to the paralyzing action on the human element, as, for example, the shutting-down of factories through the gassing of the surroundings, so as to render them unapproachable to workmen, or to the action of incendiary material, as, for example, the setting on fire of a grain elevator by dropping incendiary bombs. It is felt, however, that in both cases the question becomes no longer one of purely chemical action and that, although the introduction of certain new incendiary materials has improved this particular branch, the problem has not been essentially changed by the introduction of chemical warfare, as grain elevators can be set on fire with high-explosive bombs and factories rendered useless by shelling them or bombing them from the air. It is to be remarked, however, that the dropping of a few airplane bombs filled with a high-power lachrymatory gas would as effectively shut down a factory, say, a steel mill, for as long as a month without causing any considerable destruction of life or property such as would ensue by long-range shelling or bombing with high explosives.

"In the case of mine pits and galleries, a thorough drenching with a persistent gas, such as mustard gas, or even a simple lachrymatory gas, such as chloracetophenone, would render them unapproachable, except for those duly protected, perhaps for months. The conditions of a mine pit would be ideal for making the gas retain its properties much longer than in the open air, but even under those conditions the gas would eventually be acted on by moisture, even though slowly, and in the course of time would completely disappear. Properly protected disinfecting squads would help along the cleaning of the mine, which would resume operations in a far shorter period than would be the case if the galleries and pits had been blown in with high explosives."

To sum up, "no agent is at present known which would produce a chemical destruction of sources of wealth except through its action on the human element connected with the exploitation."

Protection against the Chemical Weapon

The efforts described above are those which would take place if means of protection were not employed. Fortunately, however, the development of the means of protection against noxious substances has kept pace with the extensions of the use of such substances in war. Protection has been obtained by the use of insulating and filtering apparatus. The insulating contrivance consists of a more or less simplified form of diver's apparatus which insulates the wearer from the external atmosphere and supplies him with the oxygen which he needs. In theory, it is a satisfactory solution and one which applies equally to all noxious agents and all degrees of concentration. These contrivances, however, inconvenience the combatants to such an extent that they have been discarded for filtering apparatus. The latter rid the air which is breathed of noxious products by interposing a suitable filter in front of the orifices of the respiratory channel. These filters are either absorbent, porous bodies, dissolving liquids, chemical, reagents or actual strainers.

The various forms of filtering apparatus have proved remarkably effective. Masks taken from men who died from gas poisoning, when subjected to laboratory examination, were found not to be "exhausted"; death had taken place in consequence of the mask having been put on too late, improperly adjusted, or removed too soon.

However, as Professor Angeli points out:

"If the concentration exceeds a certain limit, even masks become useless; the men are thus without any means of defense, and, even in those places which were formerly regarded as safest, they cannot escape death."

It is, indeed, essential to the effectiveness of any of these means of protection that those who are to employ them should have them readily at hand and should be trained in their use. Against unprepared and untrained persons the effect of chemical warfare is terrible indeed, as we saw when troops were, at the first use of the chemical arm, suddenly called upon to strive defenseless against a form of attack which, relying on the Hague Convention, they had never contemplated until it was suddenly launched against them. A similar experience would be undergone the first time chemical warfare is employed against civilians.

Protection is still lacking against blistering gases since it would require the wearing of insulated clothing (which would soon prove intolerable), for no filtering clothing exists. The only way, therefore, to obtain protection against blistering gases is immediately to withdraw men who have been subjected to their action, who will at the best remain unfit for military service or other work for several days. Further, no way has been found of providing protection for horses against any poison gas. The large amount of air which they require, their restlessness, and the fact that they must have a bit, have made the solution of the problem impossible. Carrier pigeons, on the other hand, live without difficulty in cages protected by cloth impregnated with re-agents.

Such is the present situation, but there is always the fear that the means of protection may one day prove insufficient.

Summary

The chemical arm, as employed during the last war with increasing intensity and undeniable efficacy, produces the most varied physiological effects. "There are no conceivable limits to its power, its efficacy, and its variety, any more than there are limits to pharmacology or any other branch of chemistry." But, although its very serious effects on unprotected men may be mitigated by adequate protective measures, the problem of the protection of the civil population remains to be solved.

As the harmful substances employed are in constant use in peace

time, the chemical arm is at the disposal of any great industrial Power possessing chemical factories, a fact which has led Professors Zanetti and Mayer to draw the following conclusions in their reports.

Professor Zanetti says: "The extreme facility with which these factories can be transformed almost overnight into factories for chemical warfare material introduces an element of fear and distrust towards a chemically powerful neighbor that can easily be understood by those familiar with the possibilities of chemical warfare." "It gives an immense superiority to any Power with hostile intentions," observes Professor Mayer. "An injurious substance studied in secret (and this study may be carried out in any chemical works), and launched unexpectedly against any unprepared population can completely destroy every shadow of resistance."

II. BACTERIOLOGICAL WARFARE

In contradistinction to the chemical arm, the "bacteriological" arm has not been employed in war. Apart from all humanitarian considerations, the reasons for this may be found in the contemplation of the effects it might produce were it ever resorted to, as set forth in the statement drawn up for us by Professors Pfeiffer, Bordet, Madsen, and Cannon. This statement does not, however, constitute the final word on the subject; for, although the conclusions drawn may be comparatively reassuring for the present, they nevertheless direct attention to the possibilities which the development of bacteriological science may offer in the future, and consequently to the importance of not allowing ourselves to be lulled into any false sense of security.

A priori, the effects of the bacteriological arm can neither be measured nor localized; they would reach the civilian population, would cross frontiers, and might reappear or continue even after the cessation of hostilities. It may be said that this arm would be aimed indirectly against all mankind.

Professors Pfeiffer, Bordet, and Madsen, however, are of the opinion that such warfare would have little effect on the actual issue of a contest in view of the protective methods which are available for circumscribing its effects.

The pollution of drinking water by cultures of typhus or cholera germs would be combated by filtering as already practiced in large

centers, or by treating the waters of rivers with chlorine. The enemy would have to contaminate by means of aircraft the filtered water of the reservoirs directly; this would be a difficult operation and its effects would be frustrated by preventive vaccination.

The propagation of plague by pest-infested rats would be as dangerous for the nation employing this method as for its adversary, as rats pass freely between the lines of both armies. Experience has shown, moreover, that it is possible speedily to check an outbreak of plague. Moreover, the danger of an epidemic of typhus propagated by lice has greatly diminished.

As regards the poisoning of weapons, the experts point out that the germs which could be employed (streptococci or staphylococci, anthrax spores, glanders bacilli, etc.) would not preserve their dangerous properties if they were prepared a long time beforehand and allowed to dry on metallic surfaces. Nor if placed in a projectile would these germs better resist the shock of discharge, the rise of temperature, and the violence of an explosion which destroys all life. The only method presenting a certain danger would be that of dropping from airplanes glass globes filled with germs.

Finally, the majority of the experts are of the opinion that bacteriology cannot at present produce infective substances capable of destroying a country's livestock and crops. Professor Cannon, however, does not entirely concur in this latter opinion, since he admits the possibility of airplanes disseminating over wide areas parasites capable of ravaging the crops.

In short, the scientists whom we have consulted are of the opinion that our present knowledge of hygiene and microbiology would limit the extension of any epidemics which might spread either among combatants or the civil population, and that such epidemics could not have any decisive influence on the issue of hostilities, although the experts do not consider the bacteriological arms as at present capable of paralyzing an enemy's defense. But, while they do not regard this double-edged weapon as particularly formidable at the present moment, other opinions are also current which would justify us in keeping carefully in touch with the progress of bacteriology. Professor Bordet refers to the discovery in the court of the German Legation in Bucharest of cultures of glands with requisite instructions for contaminating the Roumanian cavalry.

Possible Use of the Chemical Arm against Civilians

There is one very important aspect of chemical warfare of which we have so far said little in this report, namely, the possible use of poison gas against great cities and other nerve centers of the belligerents. It is difficult to discuss the matter in any detail because so far there has happily been no example of such a thing. Yet it must be admitted that technically there does not appear to be any reason why a poison gas attack from the air or by long-range guns used in modern warfare, either on land or sea, might not be very effectively carried out against a great city. There is every reason to believe that in a future war, aircraft would be much more numerous than in the last and they would be able to carry much heavier weights. However reprehensible such an action might be, there would be nothing technically to prevent them dropping large bombs filled with some heavy poison gas over localities essential to the political or economic life of an enemy country. The gas to be employed would not necessarily be one which only disables human beings for a time, since the object would be to hamper or destroy some continuous activity aimed at by the attack. Mustard gas, for instance, dropped in large quantities would be likely to hang about the cities and slowly penetrate the houses. It is much to be hoped that some means of protecting the civil population from such an attack may be found. But it is right to point out that the problem is a difficult one. To furnish a whole population with gas masks would seem almost impracticable, and methods for collective protection have yet to be proved efficient; yet, short of that, and especially in the absence of any knowledge as to where the attack was to be delivered, no complete protection could be secured. Moreover, heavy poison gases linger, even in the open country for quite a long time. In a city it is difficult to say how long they might remain, and during all that time the danger would continue.

It may be said that such a development of warfare would be too horrible for use and that the conscience of mankind would revolt at it. It may be so, but in view of the fact that in modern wars such as the last one the whole population of a country is more or less directly engaged, it may well be that an unscrupulous belligerent may not see much difference between the use of poison

gas against troops in the field and its use against the centers from which those troops draw the sinews of war.

Noting, therefore, on the one hand the ever-increasing and varying machinery of science as applied to warfare, and, on the other, the vital danger to which a nation would expose itself if it were lulled into security by over-confidence in international treaties and conventions, suddenly to find itself defenseless against a new arm, it is, in the opinion of the Commission, essential that all nations should realize to the full the terrible nature of the danger which threatens them.

APPENDIX III

DEFINITION OF A BOMBING PLANE

WHAT is unladen weight? Annex I of the British Draft defines unladen weight as follows:

"The unladen weight of an *aëroplane* is the weight of the *aëroplane* complete with all the elements necessary for flying but without crew, fuel, oil, cooling liquids or military equipment.

"The unladen weight of an *aëroplane* comprises exclusively the weights of the following parts:

Complete *aëroplane* without engine (wings, movable or fixed, without safety slots, fuselage or hull, undercarriage or floats);

Power plant or plants complete; empty motor or motors (1), propeller or propellers, with all the necessary accessories (2) required for their immediate operation and control;

Empty tanks, with release or drainage appliances (if any), but excluding supplementary tanks;

Permanent fixtures required for mounting instruments and equipment of all kinds."

"(1) The empty motor comprises the motor proper with all the accessories necessary for its immediate operation, which form an integral part of it—that is to say:

Carburetor, with controls, feed-pipes, ignition and connections, cooling liquid and oil pumps with piping on the motor, charging or supercharging gear forming part of the motor, various attachments for revolution counters and auxiliaries forming part of the motor, reduction gear and propeller hub.

"(2) Accessories to power plant:

(a) Motor controls complete;

(b) Fixed self-starters and accessories, starting magneto, claws and handles, and tanks;

(c) Fuel supply system; pumps not forming part of the motor, piping accessories, intermediate tanks, and various indicators;

(d) Lubrication system: pipes not forming part of the motor, radiators, shutters, and controls;

(e) Cooling system: piping not forming part of the motor, ra-

diators, shutters and controls, ventilators and ventilator shutters in the case of air-cooled motors, and their controls;

(f) Transmission of propellers;

(g) Accessories: various instruments, revolution-counters, and fixed extinguishers.”

APPENDIX IV

DEVELOPMENT OF GAS TRAINING AND PERSONNEL FOR GAS DISPERSION IN MODERN ARMIES

WHERE will the non-combatant be when these functions are all accomplished?

Functions of Gas Officers (From Farrow, "Gas Warfare," Appendix 9, pp. 238-243)

The essential qualities of a gas officer are technical knowledge, tact, courtesy, initiative, ingenuity, and energetic perseverance. He must bear in mind that his supply and administrative duties are not the most important, and that one of his most important duties is to advise with respect to gas offense operations. These duties cannot be properly performed from an office in the rear.

The following enumeration of functions of corps and division gas officers is suggestive and not all-inclusive:

Administration. (a) Secure and employ as near full allowance of officers and enlisted men as practicable in corps (or division) office. (b) Keep lists up to date of regimental and battalion gas officers and non-commissioned officers. (c) Study the personality of subordinate gas officers. Attempt to make the best use of them by suitable assignments, and to correct faults and weaknesses when possible. (d) Departmentalize, as far as practicable, the work of the corps (or division) gas personnel. (e) Place all enlisted personnel immediately under a responsible non-commissioned officer in charge of office. (f) Secure, if practicable, separate quarters for enlisted personnel. (g) Know by name and rank each officer on the staff and the nature of his duties. (h) Insure that the required number of regimental and battalion gas officers and non-commissioned officers are trained at proper schools. Maintain a written record of training of gas personnel, commissioned and non-commissioned, and their ability, recommending advance of those who

discharge their duties satisfactorily whenever a vacancy exists. (i) Secure as near full allowances of transportation as practicable. (j) Maintain a filing system, emphasize care of and making of maps, form and substance of reports and correspondence, appearance of office. (k) Keep a war diary.

Relations within corps (or division). (a) Maintain an intimate liaison with all staff departments. (b) Cultivate interest in gas among all officers by congenial, unobtrusive methods. (c) Request action of G-3 on reports and recommendations relating to gas discipline, training and supplies. (d) Secure official publications of necessary orders, such as zone regulations. (e) Secure coöperation of Military Police in enforcement of orders relating to gas defense. (f) Secure all necessary information, such as maps, reports and circulars concerning enemy operations from G-2 (Intelligence), concerning our own movements from G-3 (Operations), concerning casualties from the Corps (or Division) Surgeon's office, concerning casualties and our own posts of command from the Statistical Office. (g) Coöperate with representative of Inspector General and Medical Gas Officer.

Operations. (a) Furnish counsel in gas matters as requested by the Commanding General, Chief of Staff, G-3, or (Corps) Artillery Officer. (b) Act as liaison between gas troops operating in corps (or division) area and corps and division staffs, establishing understanding on the part of the staff and an appreciation of their potential value. The Division Gas Officer will aid in establishing similar relations between gas troops and units with which they are to act in the line. (c) Furnish gas troops with all available information concerning suitable targets and movements involving the possibility of activity on their part. (d) Devise plans for the use of gas, submitting them to G-3 or to Commanding Officer of Gas Troops concerned where his organization is affected. (e) Establish relations with artillery brigades (or brigade) cultivating interest in gas. (f) Maintain liaison with Munitions Officer and Artillery Operations Officer, also Salvage Officer, and be cautious in recommendations of artillery gas programme, leaving all matters of recommendation which are exclusively in the field of artillerists. (g) Report without delay direct to the Army Chief of Chemical Warfare Service all gas offensive operations executed by troops of the division (or corps), submitting a copy of such report to G-3.

Supplies. (a) Study carefully the means of supply and probable

future needs of the division (or corps). (b) Insure an adequate supply of timely requisition on the nearest advance army depot, but keep the stock in corps park or division dump as small as compatible with local needs. (c) If not near an advance depot see that requisitions on the base or intermediate depots are placed with G-4 of the army in ample time to secure supplies.

Subordinate Units. (a) Under such instructions as may be issued from headquarters, make periodic inspections with a view toward determining the state of gas discipline, training and supplies, reporting defects to the Division (Regimental) Gas Officer and Commanding Officer of unit concerned. When corrective measures are not applied, submit a special report to G-3 for information of the Commanding General. (b) Keep the Commanding General advised of the state of gas training, discipline and supplies in division assigned to corps (or units within the division). (c) Advise next senior Gas Officer on same subject, sending copy of such report to the Chief of the Chemical Warfare Service. (d) Assist the Division (Regimental and Battalion) Gas Officers by counsel and suggestion. (e) Study the conditions within divisions (regiments, etc.) through routine report and personal interview. (f) Encourage criticism and suggestion from Division (Regimental and Battalion) Gas Officers. (g) Be watchful at all times of gas personnel who, through temperamental or other unfitness, tend to bring the Chemical Warfare Service into discredit and recommend to the Chief the transfer of such officers and men to other work. (h) Insist upon the use of proper channels of communication. (i) Accustom troops to the use of smoke, high explosives, and thermit by gas troops through demonstration and brief lectures.

Corps Troops. (a) Maintain gas discipline, training and supplies. (b) Undertake training of gas non-commissioned officers in the units not as a whole identified with front line activity (such as remount squadrons, etc.). (c) Check closely situation concerning replacement battalion and the sending of replacements to the line without proper anti-gas equipment. (d) Interview gas officers and non-commissioned of corps troops frequently for purpose of securing from them helpful suggestions and criticisms.

Casualties. (a) Keep an accurate account of casualties, noting particularly causes, avoidability, fatigue and malingering cases.

the nature of gas responsible for casualty, tactical use of that gas, ratio of shell to casualties. (b) Analyze periodically the proportion of casualties attributable to the several gases as indicated by symptoms and recollection of patients respecting smell and appearance of gas. (c) Submit report to Commanding General through G-3 when facts and findings justify. (d) Coöperate with Medical Gas Officer in securing data concerning methods of relief of gas affections and in giving them publicity within the corps (or division). Notify the Chief of Chemical Warfare Service of all such methods in use in the unit. (e) Take steps to prevent the needless salvage by hospitals of gas equipment of patients.

Enemy Material and Intelligence. (a) Secure all material, documentary and otherwise, of any gas interest through divisional (regimental) gas personnel, the salvage officers, G-2, and miscellaneous sources, and, if practicable, by examination of enemy dugouts, dumps and positions in immediate wake of infantry advance. (b) Utilize all available means of transportation for removal of non-mailable material to nearest Advance Army Gas Depot, notifying the next senior Gas Officer, or find out where it is deposited, sending copy of report to Chief of Chemical Warfare Service. (c) Deliver all non-gas intelligence thus secured to G-2. (d) Secure, if practicable, translation of gas documents before forwarding them when data is likely to be of immediate importance to Corps (divisions). (e) A set of enemy fuses and typical gas shell, sectioned, should be kept at the gas office for information of all concerned.

Training of Divisions. (a) When Division is in training recommend to G-3 to establish conferences of regimental and battalion gas officers and schools for gas non-commissioned officers. (b) Recommend to G-3 to establish a series of lectures, demonstrations, inspections and drills, for the enlisted personnel of the division.

The following is a suggestive digest of the functions of a Regimental and Battalion Gas Officer. It should be noted that responsibility for all measures taken in chemical warfare, whether in offense or defense, rests ultimately upon the commanding officer concerned, and the gas officers concerned are under their command. Usually, either the commanding officer of the regiment will order his gas officer to follow the technical advice of the

Division Gas Officer, or this may be ordered by higher authority.

(a) Keep an accurate record of training and ability of subordinate personnel, recommending such advancement as may be merited and practicable. (b) Keep the gas personnel advised of the latest available data, holding frequent conferences and inviting suggestions and criticism. (c) Exact strict compliance with orders relating to inspection by subordinate personnel condition of material, gas discipline and reserve supplies by means of personal supervision and frequent inspections. (d) Insure the immediate availability of authorized reserve anti-gas supplies, their suitable transportation and proper issue. (e) Advise commanding officers of the proper precautions to be taken in anticipation of gas attacks, and in the event of such attacks keep informed concerning all action taken. (f) Minimize false alarms and supervise instruction to sentries, insuring active liaison with gas personnel of subordinate and superior commands. (g) Secure sufficient first aid relief in exposed areas. (h) Furnish counsel to the Commanding Officer in gas matters and stimulate interest in and understanding of the use of gas on the part of all officers. (i) Furnish liaison between the command and gas unit operating therewith, insuring sufficient understanding by troops of nature of proposed activity of gas unit operating therewith, in order to enable them to take full advantage thereof. (j) Report accurately and promptly concerning the enemy use of gas and its effect. In case of artillery gas officers, report in addition concerning delivery of gas upon enemy objectives. (k) Secure strict compliance with zone regulations and punishment of offenders. (l) Minimize waste of anti-gas material, applying disciplinary measures of offenders and insuring the full and proper use of all anti-gas supplies. (m) Advise the next senior gas officer of the location of finds of enemy gas material or cause prompt delivery thereof to his office.

Inspections of divisions by corps gas officers and of regiments by division gas officers should be frequent and thorough, thereby stimulating initiative and interest of subordinate gas personnel, furnishing basis for the removal of the unfit, advancement of the meritorious, and securing helpful suggestions for the improvement of the Service.

In general, the basis of inspections should be the determination by interview of the activities of the Gas Officer of the unit inspected and the instructions issued by him, followed by investiga-

tion of conditions in subordinate units, and the manner in which existing instructions are complied with by the gas personnel of these subordinate units.

The Gas Officer should obtain maps and information regarding enemy dispositions and study the character of the enemy terrain with the view of selecting favorable targets for gas. He should study friendly terrain in order to select favorable positions for emplacements. Information should be obtained from the Chief of Artillery regarding the availability of guns of various types and calibers. He should also obtain from the munitions officer information regarding the material available for use. The Commanding Officer of gas troops should be consulted regarding the use of cylinders, projectors and trench mortars, their availability and the feasibility of any project which might be contemplated.

APPENDIX V

SOME PEACE-TIME USES OF AVIATION

A. TRANSPORTATION

1. Air Transport (in which the United States now leads the world)
 - a.* Mail
 - b.* Passengers
 - c.* Express
2. Aërial photography
3. Aërial mapping
 - a.* Line maps and topographical maps (for example, of the United States and Mexico, and 400 square mile map of Philadelphia)
 - b.* Aërial obliques for newspapers, advertisers, publishers
4. Short pleasure and sight-seeing trips
5. Longer chartered flights
6. Demonstration and exhibition flying
7. Aërial surveys
 - a.* Oil companies prospecting for favorable geological formations
 - b.* Lumber companies surveying huge timber tracts
 - c.* State highway departments making road surveys
 - d.* Cities and towns planning civic developments
 - e.* Public utility companies looking for dam sites and locations of power lines
 - f.* Surveys for mineral deposits
8. Firms using planes in business
 - a.* Insurance companies
 - b.* Newspapers
 - (1) Aviation editors

- (2) Delivery of papers to rural routes and summer resorts
- (3) Carrying of news pictures
 - (a) Nova Scotia, Nicaragua, Kansas, within two weeks
- (4) "Scoops" made easier by air
 - (a) Reporting of bank robbery; fight by sport editor; dramatic critic flies to "first nights"
- c. Oil drillers
- d. Sales surveys to determine buying power of districts
- e. Attorneys
- f. Power interests, to make surveys and patrol transmission lines
- g. Express companies (see 1)
- h. Advertising agencies
- i. Roofers
- j. Department stores
- k. Publishing houses
- l. Automobile, accessory, and tire manufacturers
- m. Sale of washing and ironing machines
- 9. Importer and exporter benefited by increased speed in opening new markets
- 10. Amphibian as yacht-tender

B. AGRICULTURE

- 1. Dusting of crops
 - a. Cotton
 - b. Beans
 - c. Melons
 - d. Cauliflower
 - e. Peas
 - f. Grapes
 - g. Walnuts
 - h. Prunes
 - i. Citrus crops
- 2. Seeding
 - a. Rice
 - b. Clover seed for feed
- 3. Scouting by cannery proprietors
- 4. Surveying for blights such as pink bollworm, cotton pest

C. ENGINEERING

1. See A—3, 7, and 8
2. Surveys,—to eliminate hill-climbing, swamp wading, brush-cutting, etc.
3. Hauling of gold mining machinery (was hauled sixty miles inland in New Guinea)

D. OTHER SCIENTIFIC USES

1. Government Weather Bureau
2. Geological Surveys
3. Archeological surveys

E. ERRANDS OF MERCY AND EMERGENCY USES

1. Flood control surveys
2. Flood relief work (such as that of the Lindberghs in China)
3. Medical work
 - a. Doctor visits out-of-town patients
 - b. Airplane used as ambulance
 - c. Serum and other supplies taken to remote corners of the world (as Alaska)
4. Police work and government emergencies
 - a. Oil thieves caught
 - b. Money rushed to banks threatened with runs
5. United States Coast Guard in search for
 - a. Lost boats
 - b. Lost persons
 - c. Lost property of various kinds (surface craft notified by radio)
6. Rushing food in emergencies (*e.g.*, snowbound Indians in western state)
7. Aiding of disaster victims
 - a. At Managua, Nicaragua
 - b. At Belize, British Honduras
 - c. On an isolated Mexican beach
 - d. Shipwrecked survivors of "Baden Baden" in Caribbean

F. CONSERVATION OF GAME AND NATURAL RESOURCES

1. Control of forest fires
2. Stock and wild game census

- a.* Counting live stock
- b.* Counting elk on forest ranges
- c.* Locating lost herds of sheep.

G. HUNTING AND EXPLORATION

- 1. Hunting big game (as elk)
- 2. Exploration of distant parts of the globe
 - a.* Byrd in the Antarctic
 - b.* Lindberghs in Central America; in China

H. PRIVATE FLYING

- 1. American fliers take planes to Europe for tours
- 2. Private fliers log 30,000,000 miles

(N.B. Private ownership of aircraft by individuals and corporations for use in sport or business were 40% of all licensed planes in the United States at the end of 1931, compared with 5% in 1926 when the Department of Commerce took over the task of registration.)

- 3. Flying clubs (Two new aviation country club units opened in the United States in 1931.)

(N.B. Whereas American members of such clubs are taxed, in Europe they receive government subsidies since they are considered reservists for a possible war emergency.)

I. AVIATION RESEARCH

- 1. Safety measures
 - a.* Lighting of airways for night flying
 - b.* Study of causes of airplane accidents
 - c.* Airport traffic control
 - d.* Study of ways of preventing vapor lock in engines
 - e.* Proper lighting of all important obstructions
- 2. Airport zoning and eminent domain
- 3. Improvements in aëronautics
 - a.* Study of reducing noise in aircraft
 - b.* Seaplane research
 - c.* Aëronautic radio research
- 4. Work of National Advisory Committee for Aëronautics

J. POLITICAL USES

1. Political campaigns carried on over lengthy itinerary
2. Planes used in international negotiations (Prime Minister MacDonald, Secretary of State Stimson, Reichsbank President Luther, and others from France, Germany, and Italy)
3. Fleet of airplanes in connection with White House conference on a proposal of international import (President Hoover, October 12, 1931)

(N.B. Value of air mail should be noted in this connection.)

From *Aircraft Yearbook*, vols. 13 & 14, 1931 & 1932 (D. Van Nostrand Co.) and other sources.

APPENDIX VI

INTERNATIONAL CONTROL OF AVIATION

BEFORE the Great War, five international congresses on aviation were held, devoted mainly to the mechanics of flying, but also giving some consideration to governmental questions and rules of flying. The first International Congress of Aëronautics met in Paris in 1889 at the invitation of the French Government, with unofficial delegates from Brazil, France, Great Britain, Mexico, Russia, and the United States. Among the practical problems, legal as well as scientific, which were discussed, five are especially noteworthy. The first, which the Congress itself answered in the affirmative, was whether governments should issue licenses in civil aviation. The other four, referred to a Permanent International Commission of Aëronautics, were, briefly:

Should there be specific legislation to regulate the responsibility of aviators to passengers and the public?

Should salvage of wrecks be governed by maritime law?

Should there be new rules for establishing the death or absence of lost aviators?

Should the rule of war be changed whereby aviators are treated as spies rather than as belligerents?

Similar Congresses were held in Paris, in 1890 (where official delegates represented Belgium, Cuba, Ecuador, France, Great Britain, Mexico, and the United States, and unofficial delegates attended from Austria, Germany, Italy, Rumania, Russia, and Sweden); in Milan, 1906; in Nancy, 1909; in Turin, 1911.

Meanwhile there had been a movement among jurists to codify aërial law and draw up rules and regulations. As early as 1880 the Institute of International Law, comprising eminent legal authorities from nearly every civilized country, drew up laws for war on land which gave aviators the status of belligerents. By 1900, at the meeting of the same body, a prominent French jurist, Paul Fauchille drew attention to the need for a code of air law, and the next year he published an authoritative book on that subject.

The same man, at the Institute's meeting in Brussels in 1902, made his famous pronouncement:

"The air is free. The states have no authority over it in time of peace or in time of war other than that which is necessary for their own preservation."

In 1906, at the Institute's meeting in Ghent, M. Fauchille with an eminent fellow-jurist successfully defended the French point of view as against that of a leading British jurist. When the Institute met in Madrid in 1911, it debated a proposed code drawn up by M. Fauchille which formed the basis for the adoption of three basic principles of Aërial Law in Peace Time whose soundness no one would question. Unfortunately, as a final part of this miniature aërial law code, mainly French in inspiration, there was also adopted a principle of Aërial Law of War:

"Air war is allowed, but on the condition that it does not present for the persons or property of the peaceable population greater dangers than land or sea warfare."

As a result of French initiative, in 1909 (the very year in which Bleriot flew over the English Channel) a committee was founded to secure the adoption of an international air code by all governments, the *Comite Juridique International de l'Aviation*. The work was supervised by a Directing Committee in Paris which received reports of findings by local committees elsewhere. Three congresses of this body were held: in Paris, 1911; in Geneva, 1912; and in Frankfurt, 1913. An aërial code was framed covering these general subjects:

General principles of air law	Wrecks
Nationality and registration of aircraft	Aërial jurisdiction
Law of landing	Proprietorship of the air
Jettison	Damages

The committee and its congresses stood throughout for freedom of the air.

By this time, however, legislation enacted by separate governments denied this aërial freedom. Unequivocal sovereignty was claimed in laws passed by Great Britain and by parts of Germany and the United States. There was little agreement in these laws except for the matter of nationality of aircraft. The principle that the atmosphere is subject to police regulation received support

also in such international gatherings as the International Juridical Congress for the Regulation of Air Locomotion, in which Italy, France, England, Monaco, and Switzerland met at Verona in 1910, and the 1913 meeting at Madrid of the International Law Association, predominantly British and American. At the latter meeting the second of two resolutions recognized international freedom of aërial navigation subject to regulation while the first of these asserted the right of every state to enact such laws as it saw fit regarding the passage of aircraft over its territory.

Another pre-war influence is found in the two Hague Conferences, in 1899 and 1907. At the first of these, when balloons were still the only practical flying craft, a five-year ban on aërial warfare was adopted, binding only as applied to wars between the contracting parties. It was signed by twenty-four nations and ratified by most of these. Efforts to adopt a similar prohibition in 1907 failed, for in the meantime the Zeppelin airship and the Wright airplane had begun to demonstrate their practical usefulness.

An International Conference on Air Navigation in which eighteen European states met in 1910 at the call of France framed a draft convention on air law for peace time only which remained unsigned because the states were unable to settle that moot point as to whether aërial navigation should be free or whether each state should have sovereign rights to impose restrictions on planes of other nationalities. The following year the British Parliament passed an act placing foreign aircraft under strict supervision.

Air regulation for peaceful purposes was postponed throughout the war period until the Peace Conference, when there was established an Aëronautical Commission of the Peace Conference, not only for treaty drafting but also for the sake of drawing up a general convention. It was decided to make the entire post-war air arrangement separate from the treaties. On the commission were representatives of the "big five" powers and of seven less influential nations. The habit of war-time coöperation was strong enough to lead France to agree to the British idea of sovereignty over the air above each nation's territory. Work on the convention was done by three sub-commissions, following a list of principles laid down by the main commission. Within an amazingly short time the convention was drawn up, some of the main features of which were as follows:

Recognition of the complete sovereignty of every state. Flying over the territory of a foreign state must absolutely conform to the regulations of that state.

The right to innocent passing over the territory of any foreign state was recognized. If a state wished to prohibit flying over certain areas within its boundaries, such prohibition was to apply to its own nationals as well as to foreign pilots.

Rules for the nationality and registration of planes, and for issuing certificates to planes and licenses to pilots; patent regulations.

Carrying of munitions in international air navigation forbidden.

Agreement to exchange statistical and meteorological information.

International air disputes to be referred to the World Court.

Although arrangements were made whereby ex-enemy states and Russia might join later in this arrangement, unfortunately states were prohibited from allowing the aircraft of those non-contracting states to fly above their territory. This provision was highly unsatisfactory to the ex-neutral states, which found it possible to change this regulation in 1922.

The Air Navigation Convention of 1919 had created an organization which was the outgrowth of the Interallied Aviation Committee, called the Commission Internationale de Navigation Aérienne, a permanent international body to take care of administrative and legislative aspects of international air procedure, leaving the judicial phases to the World Court. In this international air commission two representatives each are allowed to France, Italy, Japan, and the United States, and one each to Great Britain, India, each of the Dominions, and all other states. Among its functions are the receiving and distribution of reports, the adaptation of detailed rules to the constant changes to which aerial navigation is subject, and study of the progressive revision of the convention to conform to advanced procedure. The commission issues a weekly Bulletin of Information which has been found very helpful. It has made numerous important decisions on such matters as the standardization of planes for the purpose of issuing certificates, uniformity of maps, methods of wireless communication, air traffic codes—including rules for lighting and signalling.

Amendments to the Convention of 1919 are easily submitted, but become effective only upon the ratification of all the contracting states. In 1926 an amendment was adopted to end unequal

voting, and now each state, of whatever size or importance, has but one vote.

Rules to be observed by Germany were drawn up by the Conference of Ambassadors in 1926 to supersede the harsher restrictions imposed by treaty which had completely strangled the development of civil aviation, as follows:

"1. The prohibition of all aircraft, armoured, armed, protected, or equipped for military use;

2. The keeping of registration lists to be placed at the disposal of the League of Nations and recording all air material and all pilots, including those with licenses covering the flying of small sporting machines only;

3. The publication of all information given in these lists;

4. The prohibition of all public subsidies to sporting aviation, whether granted by the Reich, the States, or the communes;

5. The prohibition of pilotless *aéroplanes*;

6. Limitation of the participation in a private capacity of members of the Reichswehr and navy in sporting aviation to a very small number of persons—thirty-six at the maximum—and only at their own expense.

7. The laying down of restrictions regarding air traffic and the construction of airports in the neutralized zone;

8. The prohibition of the maintenance of police aircraft."

Provisions for the advancement of civil aviation and arranging for its growth on a non-military basis have been suggested by the Preparatory Commission for the Disarmament Conference in Article 28 of its Draft Convention, with the hope of the adoption of these or similar rules by the Disarmament Conference, as follows:

"1. The High Contracting Parties shall refrain from prescribing the embodiment of military features in the construction of civil aviation material, so that this material may be constructed for purely civil purposes, more particularly with a view to providing the greatest possible measure of security and the most economic return. No preparations shall be made in civil aircraft in time of peace for the installation of warlike armaments for the purpose of converting such aircraft into military aircraft.

2. The High Contracting Parties undertake not to require civil aviation enterprises to employ personnel specially trained for military purposes. They undertake to authorise only as a provisional and temporary measure the seconding of personnel to, and the employ-

ment of military aviation in, civil aviation undertakings. Any such personnel or military material which may thus be employed in civil aviation of whatever nature shall be included in the limitation applicable to the High Contracting Party concerned in virtue of Part I, or Articles 25 and 26, of the present Convention, as the case may be.

3. The High Contracting Parties undertake not to subsidise, directly or indirectly, air lines principally established for military purposes instead of being established for economic, administrative, or social purposes.

4. The High Contracting Parties undertake to encourage as far as possible the conclusion of economic agreements between civil aviation undertakings in the different countries and to confer together to this end."

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